AIR CONDITIONING HEATING AND VENTILATING

AY, 1958—55th Year

Refrigeration Unit Serving as Heat Pump in Office Building, Spokane, Wash. See Page 126

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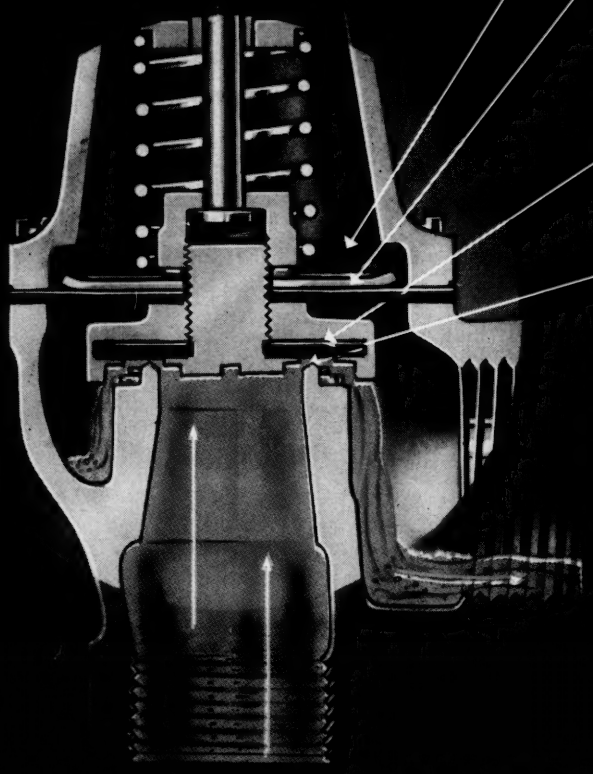
WHAT DO YOU LOOK FOR IN ASME PRESSURE SAFETY RELIEF VALVES?



Double-Safe Design — No m... chanical guides—not diaphrag... operated.

Water Seal — Provides prec... alignment of seat to disc e... inating need for hazardous m... chanical guides which can st... or freeze a valve shut from l... or corrosion.

Stickage-free Disc-to-Meta... ing — heat resisting, stic... proof silicone disc materi...

Positive Pop Action — V... operate by pressure ex... directly against **the disc** to ... valve wide open for steam re... Operation does not depe... diaphragm, thus diaphragm ... ture cannot cause valve fa...

Corrosion-Resistant — All ... constantly in contact with w... are commercial bronze ... parts are of nonferrous mat... No dissimilar metals used

ENGINEERING DESIGN

The most advanced design in A.S.M.E. rated pressure relief protection for hot water boilers is the new *Double-Safe* design of Watts Valves.

These are water pressure relief valves with an *emergency* steam rated pressure safety relief feature. They will discharge excessive water pressure created by thermal expansion and also excessive steam pressure in the event of emergency temperature conditions.

FULL SELECTION OF SIZES

Watts offers the most complete line of boiler safety relief valves with the 174A Series and 74A-740 (expanded outlet) Series. Designed to meet the smallest or largest requirements for pressure protection from one line of valves, Watts A.S.M.E. Rated Relief Valves furnish complete protection for the great majority of hot water heating and supply boilers *with a single valve.*

Watts Regulator Company • Lawrence, Massachusetts

Watts A.S.M.E. Rated Pressure Relief Valves are available in capacities from 500,000 BTU/HR to 14,370,000 BTU/HR with valve settings from 30 to 150 lbs.

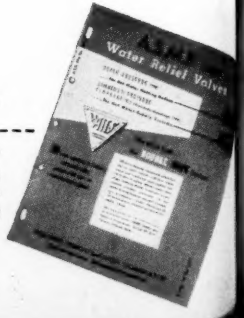
Be on the safe side with

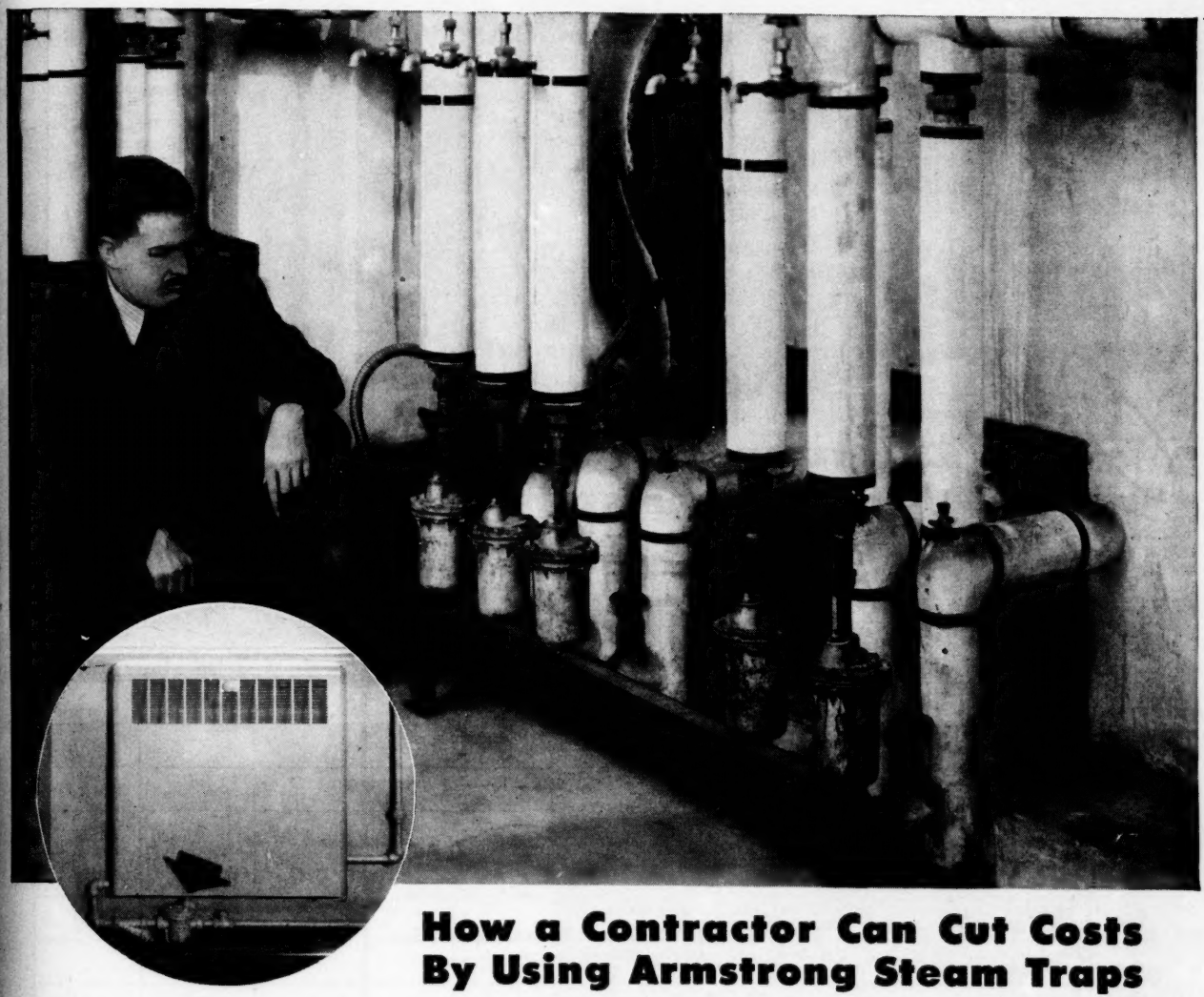
WATTS

Protection and Control Specialties

For complete Specifications,

Ratings, and Application Information on Watts A.S.M.E. Rated Valves, see your wholesaler or send for Bulletin F-ASME.





How a Contractor Can Cut Costs By Using Armstrong Steam Traps

● There is more than meets the eye in steam traps. If you don't regularly specify Armstrongs, you ought to know about these cost factors:

1. First Cost. The size and, hence, price of a trap is determined by its capacity. The high capacity of each Armstrong trap often enables you to select a size smaller than you would otherwise use.

2. Installation Cost.

Connections. Armstrong offers you a choice of straight-through horizontal or vertical connections, as well as a right angle trap, to save fittings and labor.

Strainers—seldom needed because ordinary dirt and scale won't plug up an Armstrong. When strainers are desirable, Armstrong offers built-in strainer traps that cost less to buy and install than separate traps and strainers.

Check Valves. Here again, Armstrong offers a cost saving with a stainless steel, spring loaded internal check valve that is superior to external check valves.

3. Call-Back Cost. When you put in Armstrong traps, the job is done. The traps will work without attention, not just for a month or two or even a year, but *more commonly 3 or 4 or 5 years!* No traps have so enviable a record for low maintenance as Armstrongs because the mechanisms in low pressure traps are identical in design, workmanship and materials to those used in traps for 900 lbs. pressure, 900°F temperature.

Get the figures and the facts. Call your local factory-trained Armstrong Representative or write:

ARMSTRONG MACHINE WORKS
8465 MAPLE ST., THREE RIVERS, MICHIGAN

How to Select and Install Steam Traps for Lowest Cost:

Here are two pieces of useful literature you should have—free on request:

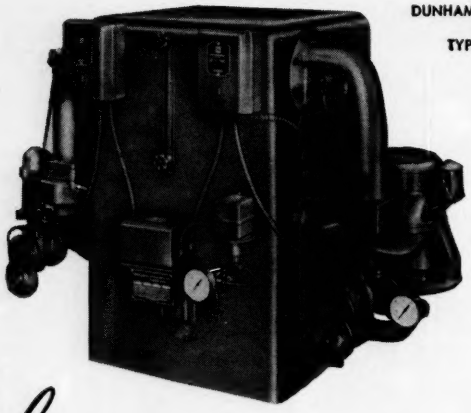
1. Armstrong Steam Trap Book—44 pages of trap data, tables, hookup diagrams and selection information.

2. Unit Heater Trapping—trap selection and installation plus BTU output tables for every model of 30 makes of unit heaters.

UNCONDITIONALLY GUARANTEED TO SATISFY THE USER

APPLICATION ENGINEERED

ARMSTRONG STEAM TRAPS



DUNHAM-BUSH VACUUM PUMP,
DUPLEX UNIT,
TYPE VRD, MODEL C2

DUNHAM-BUSH VACUUM PUMP,
SINGLE UNIT,
TYPE VR, MODEL C2

Only **Dunham-Bush Vacuum Pumps give you ALL these Features**

COMPARE THESE FEATURES	YOU Check ALL for Dunham-Bush Vacuum Pumps	How Many "Yes" Checks? Pump "A"	Pump "B"	Pump "C"
1. CAPABLE OF PRODUCING 26" VACUUM OR HIGHER AS STANDARD.	√			
2. NO CLOSE CLEARANCES REQUIRED TO MAINTAIN CAPACITY.	√			√
3. ONE PRINCIPAL MOVING PART.	√			√
4. ONLY ONE MOTOR FOR REMOVAL OF BOTH AIR AND CONDENSATE.	√		√	√
5. NO VACUUM ON PUMP STUFFING BOX.	√		√	√
6. "CODE RATED" GUARANTEEING ADEQUATE CAPACITY (AIR AND WATER)—NO NEED FOR OVER-RATING TO COMPENSATE FOR FUTURE WEAR.	√			√
7. HEAVY GAUGE COPPER BEARING STEEL TANKS FOR MAXIMUM RESISTANCE TO CORROSION.	√			
8. SINGLE AND DUPLEX—2500 THROUGH 65,000 EDR.	√	√	√	√
9. NO EXTRAS TO BUY, ALL STANDARD UNITS HAVE CONTROLS MOUNTED AND WIRED—DUPLEX HAVE MECHANICAL ALTERNATOR AS STANDARD EQUIPMENT.	√			
10. LOW LEVEL RETURN LINE CONNECTION. NO NEED FOR EXTENSIVE PITTING.	√	√		

You may get *some* of the ten important vacuum pump features in other pumps, but only Dunham-Bush gives you *all.*

The comparison chart tells the story!

No wonder top rated Dunham-Bush vacuum pumps have been delivering dependable performance . . . economical operation for years.

Get further proof why Dunham-Bush vacuum pumps are your best bet. Write for Bulletin 1401 or ask a Dunham-Bush sales engineer to call.

Dunham-Bush, Inc.

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AIR CONDITIONING • REFRIGERATION • HEATING • HEAT TRANSFER

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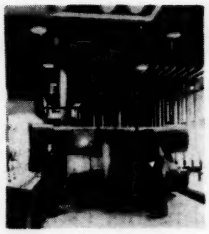
AIR CONDITIONING HEATING AND VENTILATING

Volume 55, Number 5 **May, 1958**

THE COVER



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HIGH SPOTS

• **The Solar House** near Phoenix, Ariz., which was officially opened to the public on April 13, has a solar heating system of a type which can now be used in American homes in some two-thirds of the nation—and will pay for itself in less than ten years, says the Association for Applied Solar Energy. The system, as installed, costs approximately $4,000 more to install than a conventional heating and cooling system would have cost in the same house, but the utility bills for heating and cooling will be reduced $550 annually, the Association states. For background and details, see "Prize-Winning Designs for a Solar-Heated Residence", page 76 of this issue.

A sun-heated house, the fourth in a series of **experimental heating projects at Lexington, Mass.,** conducted by Massachusetts Institute of Technology, was recently unveiled. After it is sold, MIT engineers will be able to inspect the heating plant through a special access provision. The installation is designed to supply from 75 to 80% of the total heat requirements. MIT engineers predict that some time will pass before their system will be competitive in their area.

• **For the first time in history an insulating material has been produced that has a lower conductivity than still air,** according to Johns-Manville engineers, developers of Min-K. The new product is being applied to guided missiles. Another important characteristic is the insulation's increasing efficiency with increasing altitude, a convenient fact in the campaign to penetrate the thermal barrier.

• **The Semi-Annual Meeting of the American Society of Heating and Air-Conditioning Engineers** will take place June 23-25, 1958 in the Pick-Nicollet Hotel, Minneapolis, Minn. It is planned to present 9 papers and 2 symposia during 5 sessions which will run Monday through Wednesday. Preceding the Semi-Annual Meeting the Council of the Society will meet Sunday, June 22 with various committees meeting, Saturday, June 21.

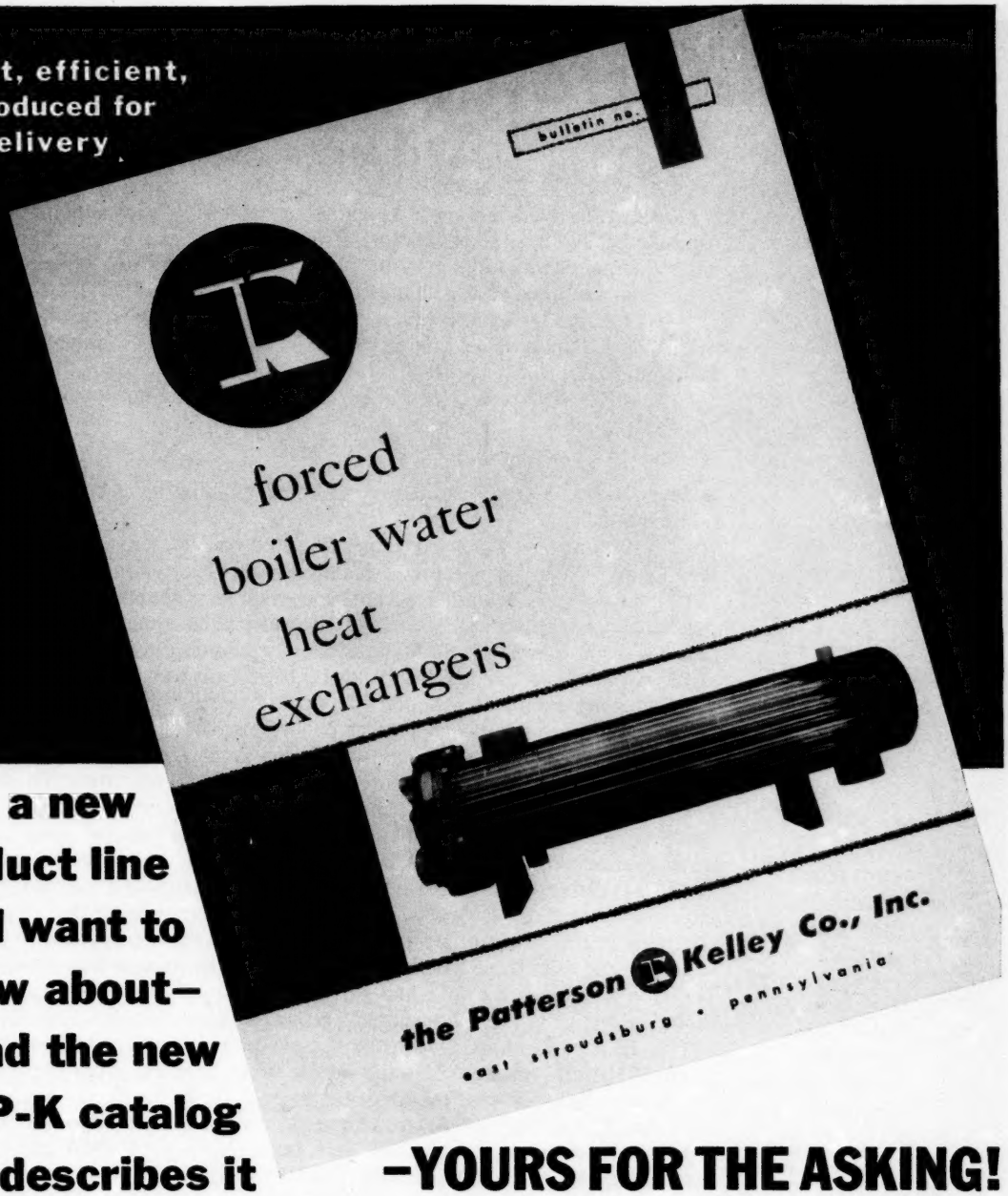
Inasmuch as the 54th Annual Meeting of the American Society of Refrigerating Engineers will take place at the same time in the Leamington Hotel, the two Societies plan to hold several joint sessions and special events.

• **An English firm is marketing an electrically-heated carpet underlay** or lining that can be plugged into the wall like an electric blanket. In sizes up to three by four yards, and priced from sixty to seventy-four dollars, the covering is said to give even floor temperatures of 70 to 75 deg F. United States producers discarded the idea seven years ago as impractical here.

• **Establishment of the automobile industry's first integrated assembly line for air conditioning installation** was announced by Chrysler Corp., Detroit, Mich. Formerly, the company installed auto air conditioners by an individual car "booth" method. The new technique is required by the growing sales of automobile air conditioners.

• **In 1957 American bituminous coal miners produced more than 10 tons of coal per man per day,** climaxing a steady rise in productivity which began to climb sharply 10 years ago. This rate compares with a figure of 2½ tons per day in 1890, and with the current rate of 2 tons per day in the Soviet Union, according to Tom Pickett, executive vice-president of National Coal Association, Washington, D.C. Bituminous coal mining in the United States is almost completely mechanized, Mr. Pickett says. About 95% of underground coal is mechanically mined. All strip mining operations are mechanized. Among the most important developments, which may bring about a revolution in coal transportation, is the work being done on coal pipelines. One already built is over 100 miles long.

compact, efficient,
mass produced for
quick delivery



a new P-K product line you'll want to know about— and the new P-K catalog that describes it

—YOURS FOR THE ASKING!

The P-K Type DW convertor and water heater is for use below the water line of steam or hot water boilers. It is engineered for high heat transfer and low maintenance and the design is standardized for a complete selection of sizes – capacities – temperature ranges – for industrial and domestic "water to water" heat applications.

Mail the coupon now for complete description, including capacity and dimensional tables of sizes available for fast delivery. The Patterson-Kelley Co., Inc., 1105 Warren St., East Stroudsburg, Penna.

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Send me a copy of Bulletin No. 6050 on the new P-K Type DW convertor and water heater.

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*Address*_____

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Patterson Kelley

Water Heater Division

Storage Water Heaters • Instantaneous Heaters Convertors • Fuel Oil Heaters

WASHINGTON OVERTONES

by LORING F. OVERMAN

● Washington overtones—the secondary results of official actions in the Nation's capital—echoed into nooks and crannies of the land as a belated Spring coaxed the city's famous cherry blossoms out of hiding. With the rose-colored blooms came a growing assurance of a quickening economy.

What mattered if it here was a dearth of statistical evidence of an early upturn! Spring's hand upon fields, homes, highways and playways sounded notes of promise and confidence.

In turn, confidence was conceded to be the key needed to unlock the impacted economy.

● Seven steps to encourage increased home building have been taken by the Administration:

(1) 2% down payment no longer required on Veterans Administration guaranteed loans. Payment of settlement charges still required.

(2) New FHA regulation permits lower down payments. Required 3% down payments now applies to first $13,500 of value, rather than to first $10,000. Action reduces by approximately $400 the down payment required on middle-priced homes.

(3) Controls in effect since August 5, 1957 on fees, charges and discounts on mortgages are removed. Action, permitting interest yield on home mortgages to be adjusted more flexibly to market conditions, should promote increased flow of private funds to federally-underwritten home mortgages.

(4) Maximum permissible interest rate on VA-guaranteed home loans, now 4¾%. Higher rate, together with elimination of discount control, is expected to make private funds more readily available. New rate will not apply to loans previously guaranteed, or which VA has already issued commitment to guarantee.

(5) Maximum permissible interest rate on FHA-insured military housing mortgages has been fixed at 4¼%. Department of Defense expects to be able to close contracts at the new rate level for about $250-million of housing for military personnel in the next three months. Contract awards expected to average 80-million per month through the first half of fiscal 1959. If the 4¼% rate fails to draw mortgage funds, the new housing law permits a further increase to 4½%.

(6) Federal National Mortgage Association received additional $325-million to buy FHA mortgages; $250-million for urban renewal program; $50-million for purchase of FHA-insured mortgages in dwelling units for occupancy by elderly persons, and $25-million for FHA-insured military housing mortgages.

(7) Administrative regulations have been issued by FNMA prescribing conditions under which it will purchase FHA-insured or VA-guaranteed mortgages on low and moderate priced homes. Mortgages are not to exceed $13,500 each.

● 918 new postoffices are under construction or will be started by early fall, the Postmaster General has announced. Estimated cost of the buildings is $49.2-million. Thirteen to cost $9.1-million, will be built under lease-purchase contracts. Remaining 905 buildings, mostly small, represent less than 10% of the Post Office Department's "urgent needs."

● Among the busiest places in Washington in recent weeks was the headquarters of the Air-Conditioning and Refrigeration Institute. Evidences:

—ARI has issued a 1958 list of room air conditioner capacity ratings stated in Btu per hour. Twenty-four manufacturers of room units are represented in the publication, distributed on request by ARI. Better Business Bureaus are also receiving copies. In addition to Btu ratings, the list includes total watt input, nameplate volts and amperage, cycle and phase of motors, and the refrigerant number used.

(Continued on page 8)

Little Drops of Water (Condensation)

Ruined a Fine Home
Cost over a Million Dollars to an Apartment Development

The owners of a path-breaking apartment development had to pay a repair bill of over a MILLION DOLLARS for ripping out condensation-soaked insulation and replacing damaged plaster walls.

It was necessary to move a fine country home to a new site—the state highway was coming through. It could not be done. The sills of the house had rotted on account of condensation in the walls.

Today's tightly built, high-humidity houses create vapor problems. Vapor, which is a gas, has 1/205,000 the density of water at 32°F; about one millionth the density at 0°F. Sometimes there is excessive flow of vapor THROUGH walls and ceilings into cold building spaces. This enhances the formation of destructive condensation, especially where an adequate vapor barrier is lacking, or where there is one with too many breaks, or which while waterproof is not sufficiently vapor-proof.

METALS ARE THE BEST VAPOR BARRIERS

There is now a new , multiple aluminum, which forms a *continuous*, edge-to-edge barrier of uniform depth between studs or joists, giving the entire area maximum protection against vapor-flow and condensation formation as well as against heat loss or intrusion.

The aluminum layers, 375 ft. to 750 ft. long are almost impervious to water vapor. Infiltration under the flat stapled flanges is slight. Condensation formation, on or within this type of insulation is minimized because of the scientific construction of multiple layers of aluminum, fiber, and air spaces.

The surfaces of this aluminum have high heat ray reflectivity (97%); low absorptivity (3%); and low emissivity (3%). Conduction is slight because of preponderant air spaces of low density. Aluminum and fiber layers retard convection, outer and inner. It is available, prefabricated, as Infra Insulation, Type 6 or Type 4.

The U. S. NATIONAL BUREAU OF STANDARDS has published an informative booklet describing the destruction that condensation can cause and means of prevention. It is entitled "Moisture Condensation in Building Walls." Send us coupon for a FREE copy.

THERMAL VALUES*, INFRA RECTANGULAR INSULATIONS
Non-metallic Insulation Equivalents†

	UP-HEAT	DOWN-HEAT	Cost, Installed‡
TYPE 3	C .143=2⅓"	C .049=**6¾"**	6¢ sq. ft.
TYPE 4	C .105=**3⅕"**	C .038=**8⅔"**	8¢ sq. ft.
TYPE 5	C .081=4"	C .034=9½"	9¢ sq. ft.
TYPE 6	C .068=4⅘"	C .034=9¾"	10¢ sq. ft.
TYPE 9	C .043=**7¾"**	C .029=**11¼"**	15¢ sq. ft.

Types 1, 2, 7, 8 also available

*Determined by method of National Bureau of Standards in H.H.F.A. Research Paper 32.
†Calculated on basis of limiting thermal values cited in Fed. Specs. LLL-f-321b; HH-I-585; HH-I-521c; HH-I-551a.
‡Approximate cost, material and labor, new construction between wood joists.

CAN BE PURCHASED THROUGH YOUR PREFERRED LOCAL DEALER

Infra Insulation Inc., 525 Bway., N. Y., N. Y. Dept. V-5
Send "Moisture Condensation in Building Walls." ☐ Samples

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FIRM_____

KIND OF BUSINESS_____

ADDRESS_____

WASHINGTON OVERTONES *(Continued from page 6)*

—A "rating certification program" for unitary air conditioners is being prepared by the Unitary Air Conditioner Section of ARI, with the cooperation of the National Warm Air Heating and Air Conditioning Association.

—A new ARI standard for "Mechanical-Draft Water Cooling Towers for use with Air Conditioning and Refrigeration Equipment," has been issued. Numbered 910-58, the standard supersedes ARI 910-55.

—ARI is keenly interested in a "Live Better Electrically" spring push sponsored by 35 major electric utility companies throughout the country. Many of the companies are planning to pin-point air conditioners, both central residential and room units, and others will seek to develop heat pump year-round air-conditioning.

—ARI noted "with regret" that manufacturers' shipments of compressor bodies for the calendar year 1957 dropped 12% below the 1956 total. The '57 total, not including compressors for household refrigerators, was 3,956,505 units. The '56 total of 4,775,843 units was 32% above 1955. Decreases during 1957 were not noted in automotive compressor units.

● Washington observers agree that Congressional activities between now and adjournment will be influenced by three primary factors—politics, the business pulse, and the Soviets.

Elections will be uppermost in the minds of all House Members; one-third of the Senators, and all whose futures are linked with those politically "in." "Getting reelected" will be a first order of business, and sensing the wishes of constituents will be a complementary goal. Coming months are those in which constituents can contact members of Congress with added assurance of a favorable reception and determined action if sufficient pressure is applied.

Current business recession is causing a lively tug-of-war among those who would spend-for-prosperity, those who would reduce taxes for prosperity, and middle-of-the-roaders who would like to wait and see. To date, proposals would try pump-priming to the extent of $5-billion, and tax-cutting at the $9-billion level.

The President is in an unenviable position with elections around the corner. He opposes tax cuts "as yet," and has vetoed such pump-priming measures as the $1.8-billion rivers-harbors bill.

"With serious misgivings" he signed the $5.5-billion highway construction bill (HR 9821). He favored speeding up highway construction, and giving impetus to private and public employment. He regretted vacating the long-established principle of a 50-50 sharing of federal-state highway costs.

Sputniks I and II, although now out of orbit, still have defense programs and budgets in a spiraling spin of increasing costs. President's fight for unification, if supported by public, might eliminate duplication of costs and effort, and unify weapons research and development.

● Production of synthetic fuels is now big business. Secretary of the Interior Fred A. Seaton has asked the House Ways and Means Committee to establish a 27½% depletion allowance for oil shale, coal, and other natural deposits when they are used as a source of synthetic liquid fuels. The allowance would be the same as that for oil and natural gas.

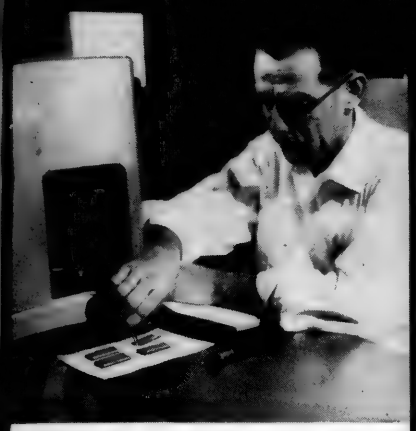
● Interior Department wants another $530,000 in fiscal 1959 for its saline water program. Increase would raise the program for the year to $1,355,000. Project is part of a 10-year schedule approved by Congress in 1952, with $10,000,000 authorized.

● Government attaches increasing importance to the water consumption problem. Census of Manufacturers for 1959 will include a question pertaining to water usage.

1 Analytical weighing of specimens prior to testing

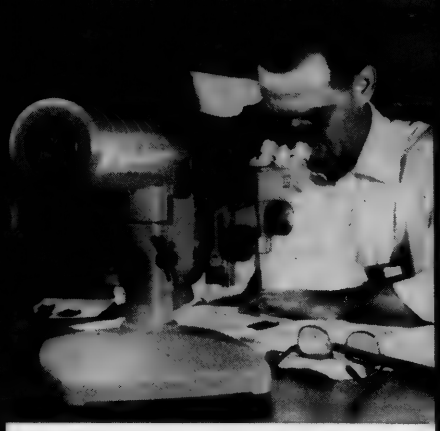
2 Steam condensate corrosion test

3 Cleaning specimens with inhibited hydrochloric acid



4 Second analytical weighing to determine corrosion weight loss

5 Calculation and statistical analysis of laboratory test results



6 Final examination of specimens under low power magnification

Extensive testing program proves new 4-D Wrought Iron more corrosion-resistant than ferrous substitutes

Test results from the Byers Research Laboratory lend documentary support to the superiority of new 4-D Wrought Iron—over standard Wrought Iron as well as ferrous substitutes.

Convincing case-history service records are now further substantiated by the conclusive findings of our metallurgical staff. Some typical results of this testing program are presented in the chart at right.

The Byers field service representative will be pleased to relate these test results to your corrosive applications. Write us for helpful literature on new 4-D Wrought Iron. A. M. Byers Company, Clark Building, Pittsburgh 22, Pennsylvania.

BYERS WROUGHT IRON

Comparative Analysis of 4-D Wrought Iron Corrosion Tests

Tests	4-D Wrought Iron	Standard Wrought Iron	Ferrous Substitutes
Severe industrial atmospheric continued exposure 17 years	Corrosion weight loss 540 grams/sq. ft.	Corrosion weight loss 655 grams/sq. ft.	Not included in test
Steam condensate return line	*At least 25% greater corrosion-resistance than standard Wrought Iron	No failures 10 years (still in service)	Complete failure after 2 years
Aerated salt water—5 weeks (Short term test—points indicate 4-D Wrought Iron curve flattening out at much lower rate of attack)	Corrosion weight loss 146 mg/sq. in.	Corrosion weight loss 170 mg/sq. in.	Corrosion wt. loss 226 mg/sq. in.
Brine piping	*At least 25% greater corrosion-resistance than standard Wrought Iron	No failures 23 years (still in service)	Complete failure after 7 years
Salt water, Gulf of Mexico ¼ inch plate—17 years	Corrosion weight loss 4 mills/years (minimum plate thickness now 3/16") Still in excellent condition	Not included in test	Corrosion weight loss 30 mills/years; plate badly pitted, perforated
Downspout	*At least 25% greater corrosion-resistance than standard Wrought Iron	No failures in 29 years (Still in service)	Complete failure after 18 years

*In this application no long term test data yet available on 4-D Wrought Iron. Results shown are derived from short term tests.

BRIEFLY STATED

• THE BINKS MFG. CO., Chicago, Ill., received the Department of Defense Reserve Award Certificate and pennant for supporting the Department's Armed Forces Reserve programs. All branches of the Armed Forces are represented by the cooling tower company's employe-reservists, who are granted leave to discharge their military obligations.

• Two scholarship awards established by the Portland, Ore., divisions of IRON FIREMAN MANUFACTURING COMPANY for entering freshmen at Oregon State College and Portland State College commit the firm to pay first-year tuition and fees to winners selected by faculty scholarship committees at each college. Each applicant will be required to submit a thesis on *Modern Heating Methods* which will be graded by professional heating engineers.

WITH THE ENGINEERS AND CONTRACTORS—Edwin H. Krieg, vice-president and consulting engineer of STONE AND WEBSTER ENGINEERING CORP., New York City, has been elected a director. Known as one of the nation's leading authorities on the design of power plants, Mr. Krieg is credited with numerous advances in the technical developments and in the application of prototype steam turbine generators . . . Dr. Edward H. Andrew, Jr., associate professor of electrical engineering, is named assistant to the director of TEXAS ENGINEERING EXPERIMENT STATION, College Station, Tex. He is a registered professional engineer in Texas and in his new position will be responsible for various activities at the Station.

WITH THE INSTITUTES AND ASSOCIATIONS—David W. Locklin will conduct research on thermal systems and combustion with special emphasis on applications for solar heating and heat storage in his new position with the Mechanical Engineering Dept., Battelle Memorial Institute, Columbus, Ohio. Mr. Locklin comes from Timken Silent Automatic Div., Scaife Co., Pittsburgh, Pa., where he was engaged in development of residential heating equipment. Before that he had spent three years at the ASHAE Cleveland laboratory. The author of several papers on fluid flow and fuel oil combustion, he is vice-chairman of Oil-Heat Institute Technical Division . . .

Prof. Linn Helander, Mechanical Engineering Dept., Kansas State College, Manhattan, Kan., has been honored with an Award of Merit in recognition of his outstanding service and achievement in teaching. The decision to make the award was made at the third annual luncheon of life members of the AMERICAN SOCIETY OF HEATING AND AIR-CONDITIONING ENGINEERS, held during the 64th Annual Meeting in Pittsburgh. Prof. Helander was head of his department last year when he retired from administrative duties. Currently he is teaching advanced air conditioning to graduate students. Among his most well known research activities are a study of downward jets of heated air, investigations into the comfort effects of panel heating, and research on the coefficient of heat transfer of condensing Freon, an effort still in progress . . .

Jesse R. Chafin has joined the Washington staff of BITUMINOUS COAL INSTITUTE as a development engineer. He brings to BCI 30 years of experience in heating, ventilating, and air-conditioning systems. With consulting engineer firms in the Washington and Baltimore area, he has been active in the design and construction of steam generating plants of various types and pressure ranges . . .

Completion in 1959 is forecast for a new $2 million semi-circular headquarters building of the AMERICAN SOCIETY FOR METALS in suburban Russel and Newbury Townships east of Cleveland, Ohio. The new structure is a gift of Wm. H. Eisenman, one of the society's founder-members and its national secretary for 40 years. The building is the first in a metal science educational program that will involve an expenditure of $20 million for science building alone. A "space lattice" or geodesic dome, as designed by R. Buckminster Fuller, Raleigh, N. C., will dominate the building. It will be 250 ft in diameter, 103 ft high, containing some 5¼ miles of aluminum tubing . . .

AIR MOVING AND CONDITIONING ASSOCIATION (AMCA), Detroit, Mich., has elected JENN-AIR PRODUCTS CO., Indianapolis, and E. VAN NOORDEN CO., Boston, to membership in the Association. Both companies are manufacturers of power roof ventilators, products included in the Association's program to provide dependably rated air moving equipment.

• Frank F. Elliott, chairman of the board of directors of CRANE CO., Chicago, Ill., announced his retirement. He is 65 and believes this is the proper point in life for an executive to step aside to provide both incentive and opportunity for qualified younger men. Mr. Elliott joined Crane in 1922 as a sales engineer at the company's Los Angeles branch. He is a trustee of the Illinois Institute of Technology and a member of the board of directors of the National Association of Manufacturers.

BURGEONING BUSINESS—Walter Jeorse, Mayor of East Chicago, turned the first spade of earth as ground was broken for a new sintering plant at the Indiana Harbor Works of THE YOUNGSTOWN SHEET AND TUBE COMPANY. All waste gases escaping from the plant, scheduled for completion next Spring, will pass through mechanical dust collectors for primary cleaning and then through an electrostatic precipitator for fine cleaning before being released into the atmosphere . . .

The new headquarters of WATER SERVICE LABORATORIES, INC., at 615 West 131 St., New York City, contains 50% more space for offices and laboratories . . . A special growth and development study in the controls and instrumentation field is under way at the DETROIT CONTROLS DIV., AMERICAN-STANDARD, headed up by its president, Charles H. Hodges, Jr., who will relinquish his duties as president of the Division for the task. William A. Haist, Jr., has been named to succeed him . . .

To expedite distribution of brass and copper mill products and copper tube and fittings on the West Coast, CHASE BRASS AND COPPER CO., INC., Waterbury, Conn., has opened a new warehouse and sales office

(Concluded on page 12)

And in Charlotte—A FUTURE OF FAULTLESS SERVICE

WACHOVIA BANK & TRUST CO. BUILDING
Charlotte, N. C.

HARRISON & ABRAMOVITZ, A. G. ODELL, JR. & ASSOC.
associated architects

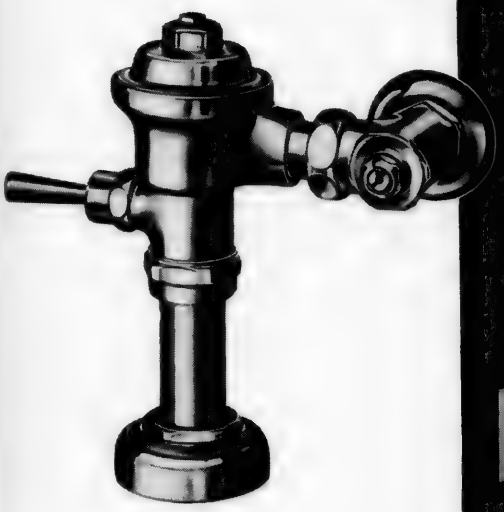
JAROS, BAUM & BOLLES
mechanical engineers

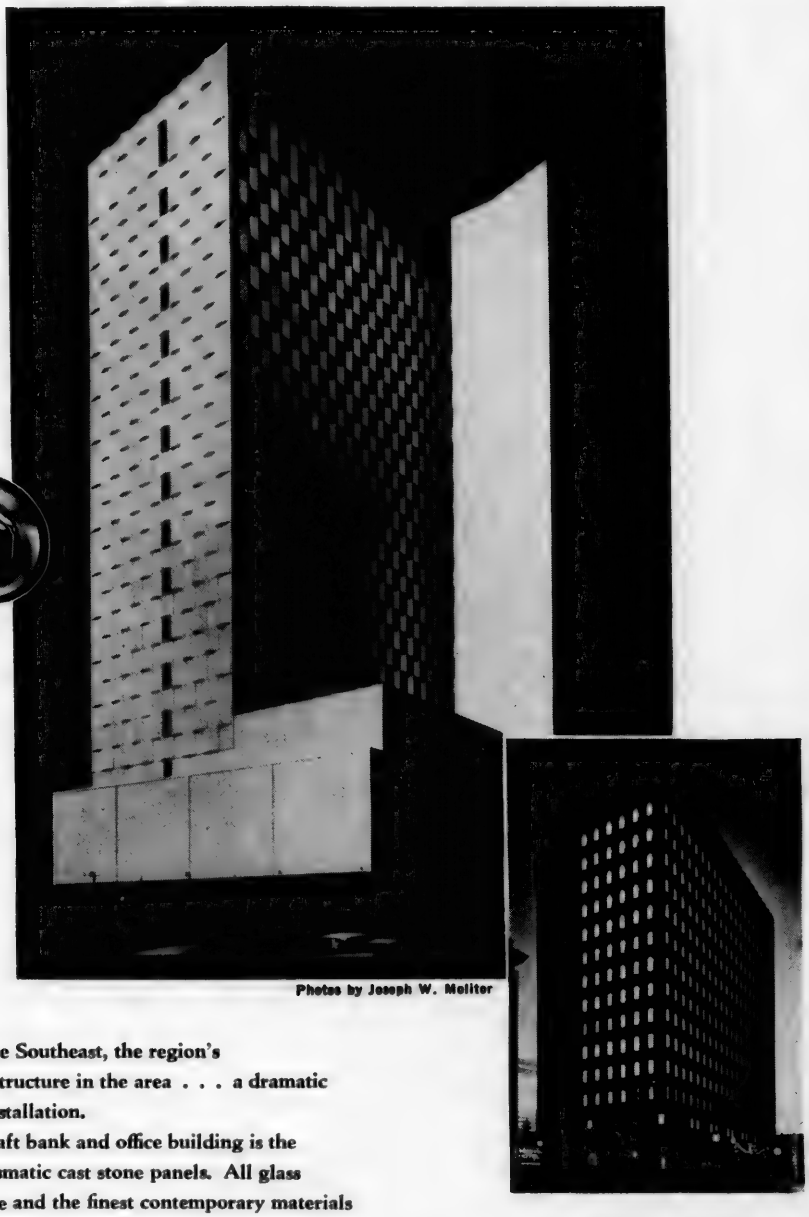
J. A. JONES CONSTRUCTION COMPANY
general contractor

A. Z. PRICE & ASSOCIATES
plumbing contractors

HORNE-WILSON, INC.
wholesale distributor

AMERICAN RADIATOR & STANDARD SANITARY CORP.
plumbing fixtures manufacturer





Photos by Joseph W. Molitor

Reflecting the unprecedented development of the Southeast, the region's largest bank has erected the first "tower" structure in the area . . . a dramatic $5,000,000 fifteen story COYNE & DELANY installation.

Resting on a two story base, the twin shaft bank and office building is the first to obtain striking surface patterns with prismatic cast stone panels. All glass is tinted light green-blue for heat resistance and the finest contemporary materials have been employed throughout this pace-setter.

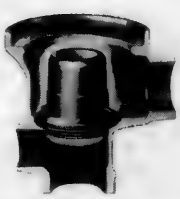
As in so many other major buildings in Charlotte, largest city of the Carolinas, it is no surprise that DELANY FLUSH VALVES were selected. In premium projects everywhere, look for DELANY — "the fastest growing name in flush valves."

DELANY *Flush* VALVES

Since 1879

RENEWABLE MAIN VALVE SEAT . . . ANOTHER FEATURE OF DELANY FLUSH VALVES . . . LEADING THE FIELD IN DESIGN AND DEVELOPMENT

DELANY Flush Valves feature a renewable main valve seat that guarantees the valve for the life of the building. Replacement of this main valve seat is accomplished in minutes without removing valve from line . . . no need for special tools. Here's just one more reason why plumbing men, the country over, are switching their preference to DELANY FLUSH VALVES.



COYNE & DELANY CO. • 834 KENT AVE. • BROOKLYN, NEW YORK

IN CANADA: THE JAMES ROBERTSON CO. LTD.

BRIEFLY STATED

(Concluded from page 10)

in South San Francisco, Calif. . . . A new company to design and produce water cooling towers for use with commercial and industrial air conditioning systems has been organized in West Concord, Mass. MASON PRODUCTS, INC., is headed by Paul H. Mason, former sales manager for Phillips Cooling Tower Co., Brooklyn, N. Y. The firm will specialize on smaller units. Towers ranging in capacities from 8 to 75 tons are now in production . . .

A broad consumer campaign by UNITED STATES STEEL CORPORATION to emphasize the advantages of modern steels is under way. Purpose is to give manufacturers, distributors, and retailers of steel goods a new selling approach. Newspaper, magazine, television ads, and promotional materials made available to utilities, banks, distributors, retailers, and others, are utilized in the campaign. A special symbol, consisting of a circle embracing the word "steel," in black, and three concave diamond shapes colored yellow, orange and blue, is developed as a trademark for all steel products. U. S. Steel urges its customers to use this symbol in marketing efforts and offers to provide labels for their products.

• CHEMETRON CORPORATION will be the new name of National Cylinder Gas Co., Chicago, Ill. Addition of new product lines and services over its 24 years has made the old name too restrictive, the company feels. The new name is made up of parts of the names of three of the major industries served by the company: chemicals (CHEM), metals (MET), and electronics (TRON). Of its seven divisions, the name of TUBE TURNS is perhaps the most well known in our industry.

• ALLIED CHEMICAL CORPORATION will be the new name of Allied Chemical & Dye Corp., New York City. Synthetic organic chemicals, which include dyes, constitute roughly only one-fifth of the company's production as a result of product expansion since the firm adopted the old name in 1920. Its General Chemical Division produces Genetron refrigerants. The company is also a major producer of polyethylene.

NEW SHOOTS—E. Paul Harder Associates, St. Louis, Mo., is a new sales distributor for CYCLOTHERM DIV., NATIONAL-U. S. RADIATOR CORP., Oswego, N. Y. Mr. Harder, owner, has been in the heating and plumbing business for 20 years, most recently as St. Louis factory representative for Herman-Nelson Corporation . . . Appointment of Eaton Equipment Co., Detroit, Mich., as sales representative for L. J. WING MFG. CO., Linden, N. J. is announced . . . Air Conditioning Associates, Somerville, Mass.; and Perfection Heating Corp., J. F. Rickard Plumbing and Heating Co., Wells & Sons Co., Rahco Refrigeration Co., of Cincinnati, Ohio; and Tri-City Heating and Air Conditioning Co., Inc., Newport, Ky.; have been appointed authorized sources for THE TRANE COMPANY . . .

The sales organization of CLEAVER-BROOKS CO., Milwaukee, Wis., is broken into five geographical divisions for concentration of control in sales: district sales managers are located in New York City, Atlanta, Dallas, San Francisco, and Milwaukee. They will report to H. F. Holtz, manager of the division . . . The valves and fittings division of CRANE CO., Chicago, Ill., has named Midcontinent Tube Service, Inc., Evanston, Ill., as distributor of its products. Midcontinent has recently organized an affiliate, Midco Valves & Fittings, Inc., to provide their customers with necessary adjuncts to tubular steel products.

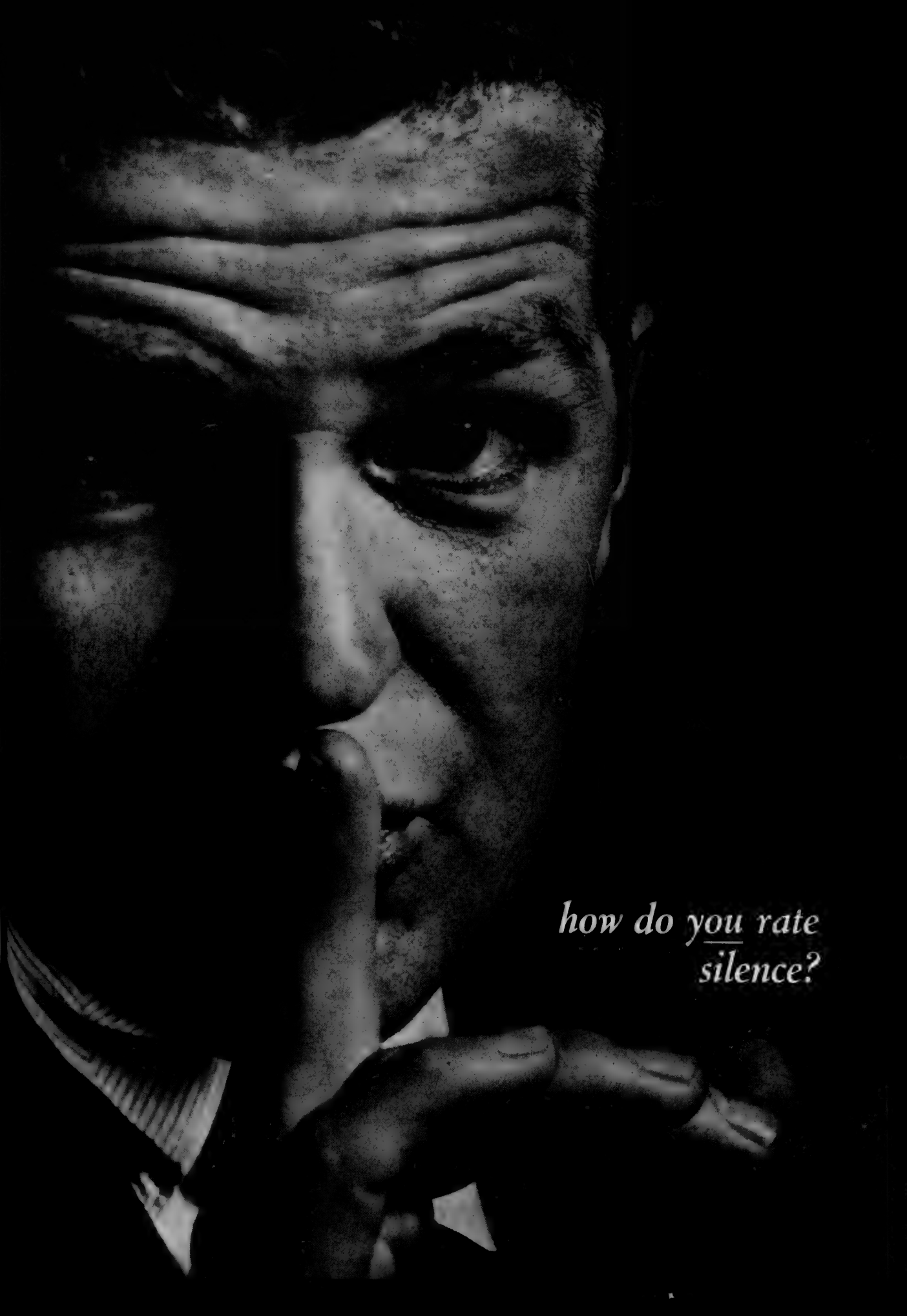
AMONG THE MANUFACTURERS' PERSONNEL—THE FAIRBANKS CO., New York, N. Y., announces the following changes in sales assignments in its Philadelphia sales office: William R. Bieretz from Materials Handling Equipment to Valves and Dart Unions, and Ellis F. Hendricks to trucks, casters, and wheels . . . Fred H. Gentsch is appointed product manager on air compressors for BRUNNER DIV., DUNHAM-BUSH INC., Utica, N. Y. . . . William B. Cott is named Northeastern regional manager for WESTINGHOUSE ELECTRIC CORPORATION air conditioning division, and Walter L. Hunken is named to the Middle Atlantic post. They will be headquartered, respectively, in New York City and Staunton, Va. . . .

Three appointments to the Project Consulting Group, a service for architects and engineers offered by Buensod-Stacey, Inc., are announced. Joining Joseph W. Kreuttner, vice-president of the company, are David Rickelton, N. S. Shataloff, and J. C. Rose . . .

W. F. Symonds, secretary of W. D. ALLEN MFG. CO., Chicago, Ill., has been elected vice-president in charge of the manufactured products division of the company . . . The Board of Directors of THE MERCOID CORP., Chicago, Ill., elected the following officers: Hugh Courteol, chairman of the board; J. F. Chambliss, president and treasurer; W. L. Colterjohn, vice-president and director; W. K. Stauffer, vice-president, Eastern Area; R. F. Fisher, vice-president; Western Area; W. E. Jones, vice-president, sales; P. J. Provost, vice-president, Industrial Division; and Paul Courteol, secretary . . .

William Peters is named manager of the New York City branch office of AMERICAN AIR FILTER CO., INC., Louisville, Ky. Mr. Peters comes to AAF from Anemostat Corporation of America, where he was assistant general sales manager . . . R. O. Gundlach is appointed regional sales manager of all WORTHINGTON AIR CONDITIONING AND REFRIGERATION activities in the Midwest region, with headquarters in Chicago, Ill. . . . M. D. Garrison is appointed district representative in the Detroit area by AMERICAN-STANDARD AIR CONDITIONING DIVISION . . . C. R. Hall is named manager of the ALLIS-CHALMERS INDUSTRIES GROUP, Rockford, Ill., district sales office . . .

M. F. Du Chateau, manager of the CRANE COMPANY branch at New Orleans since 1952, is named director of the plumbing sales division at the company's Chicago general office . . . Appointment of William W. Wexler as manager of marketing, TACO HEATERS, INCORPORATED, Cranston, R. I., is announced . . . THE TRANE COMPANY has promoted Gerald T. Kerbow to manager of its Houston sales office. H. J. Dalton, manager of the San Antonio office for the past ten years, has retired. His son, Frank, 28, succeeds him.


how do you rate
silence?

when it's ventilating equipment . . . consulting engineers

What factors are most important to men who specify ventilating equipment? What features do they look for first to make sure equipment is high quality?

A recent nationwide survey made by an independent research organization for Ilg throws considerable light on the subject . . . proves conclusively that "quietness of oper-

Here's how ILG *propeller fans assure quiet operation,*

What's in a Name? Plenty—when the name is Ilg. This "One-Name-Plate" guarantee covers *both* the quiet-running, self-cooled motor *and* the dynamically balanced, patented design fan wheel. Whether you specify or install Ilg Direct Drive Propeller Fans, you can count on quiet, vibration-free operation, low operating costs. For Ilg Type "Q" Fans and Ilg enclosed motors are designed, built, assembled and tested under one roof to exhaust *more* air *more* quietly for *more* years.

"Inhale . . . Exhale." Follow the flame and see why Ilg self-cooled, enclosed, permanently lubricated motors stay cleaner, run quieter, last longer. Fresh air (flame, here) enters vent pipe, circulates through motor, exhausts at front of fan. Ilg permanent-split capacitor single-phase and 3-phase motors never run "hot," have no wearing parts.

"Silence Is Golden." Ilg Propeller Fans feature direct drive to eliminate the noise, slippage and friction losses of belts and pulleys. In addition to "quietness tests," all Ilg Fans undergo exhaustive balancing tests to motor rotors and fan wheels before and after assembly to assure smooth, quiet operation.

For fans built to satisfy your "specs"...

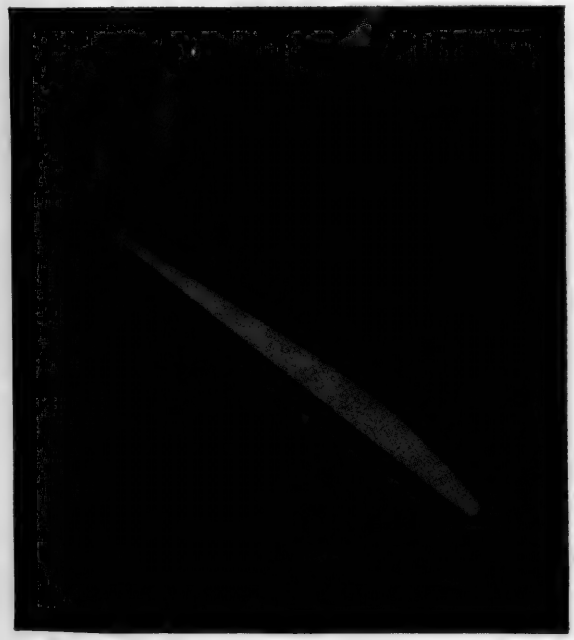
rate quiet operation No. 1 in preference poll

ation" rates *first* with consulting engineers who specify fans and ventilating equipment.

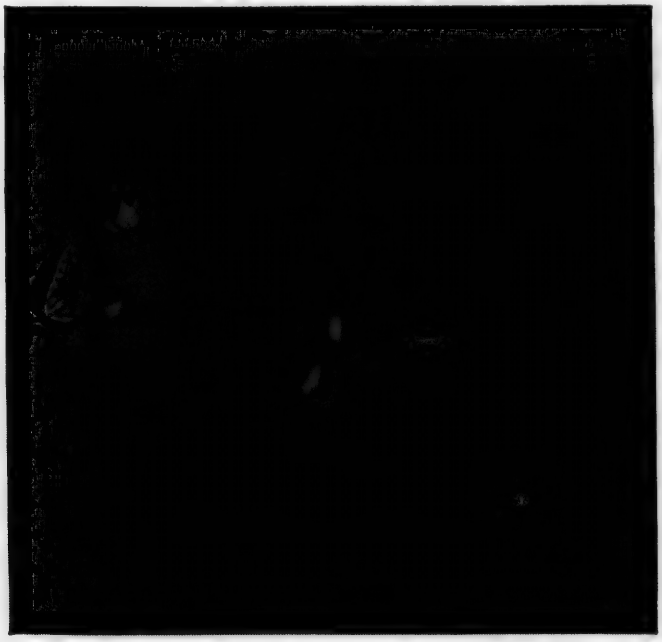
You can look to Ilg Fans and Ventilators for quietness coupled with high air volume. Consulting engineers choose Ilg because Ilg equipment combines so many of the points of quality they insist on: vibration-free operation, for example; long life; low maintenance expense; ease of repair; low operating costs—just to name a few.

Some of the reasons Ilg equipment rates so high with those who specify are shown below. For complete details on Ilg Propeller Fans, write for Catalog No. 153; on Ilg Airfoil Centrifugal Fans, send for Bulletin No. 257.

and ILG centrifugal fans vibration-free performance, low maintenance



Backward Is Forward. Ilg Backward Curved (BC) Blades and Airfoil design—the greatest step *forward* in blade design in 40 years—eliminate eddy currents and turbulence to assure quieter operation, undergo *less* drag and shock loss than blades of uniform thickness. Sound tests prove these fans can run at greater speed than older types —with *no increase in sound level.* For operations up to 9" static pressure.



Single, Silent Centrifugal. Direct-connected Ilg-built motors and Airfoil fan wheels rotate as a *single unit*—on heavy-duty, permanently lubricated ball bearings. No belts or pulleys to slip, re-align or replace periodically. No need for space-wasting separate motor mountings. Just connect an Ilg BC Airfoil Centrifugal and you're ready for any ventilating and air-conditioning job.

specify ILG

ILG ELECTRIC VENTILATING COMPANY
2851 N. Pulaski Road, Chicago 41, Illinois
Offices in 57 Principal Cities

Scientific Frontiers

New Sources of Energy

To meet a growing demand for energy in a world whose fossil fuel reserves are limited, especially in under-developed areas remote from power networks and fuel supplies, the economic possibilities of five non-conventional sources of energy are receiving attention from the United Nations Department of Economic and Social Affairs. Last month, this page discussed briefly two of these sources—solar energy and wind energy.

Tidal Energy. The mechanical energy of tides can be harnessed and converted into electricity. In principle, the conversion process is akin to conventional hydropower, utilizing falling water. A basin is filled during flow tide and closed when the tide recedes, so that a difference in head is created during ebb tide. When the water is allowed to fall toward the lower side of the dam, which contains sluices and machinery, it operates a turbine which drives a generator.

New ideas and refinements are arousing more interest in the possibility of utilizing tidal energy effectively. Instead of a single basin, two or more communicating basins may be built so that one basin generates power during the filling stage and another during the emptying stage, and water can be turbined between basins. More important, however, is the recent development of turbines able to operate in both directions of water flow and also to act as pumps, and a combination of turbine and electric generator in bulb-type units operating efficiently submerged in water.

Geothermic Energy. Geothermic energy comes as natural steam or hot water, mixed with various chemicals, under pressure in hot springs and fumaroles. Provided natural steam has sufficient volume, temperature and pressure, it may be led through a turbine driving an electric generator and then exhausted into the air. In more advanced plants, chemical by-products are also obtained.

Practical utilization of geothermic energy for the generation of electricity is a fact in Italy where facilities reached a capacity of 274,000 kw by the end of 1954, and gave an annual output of nearly 2-billion kwh. In addition, large-scale use has been made of geothermic energy in Iceland where it provides domestic heating for 40,000 people and is estimated to equal about 75,000 tons of coal per year.

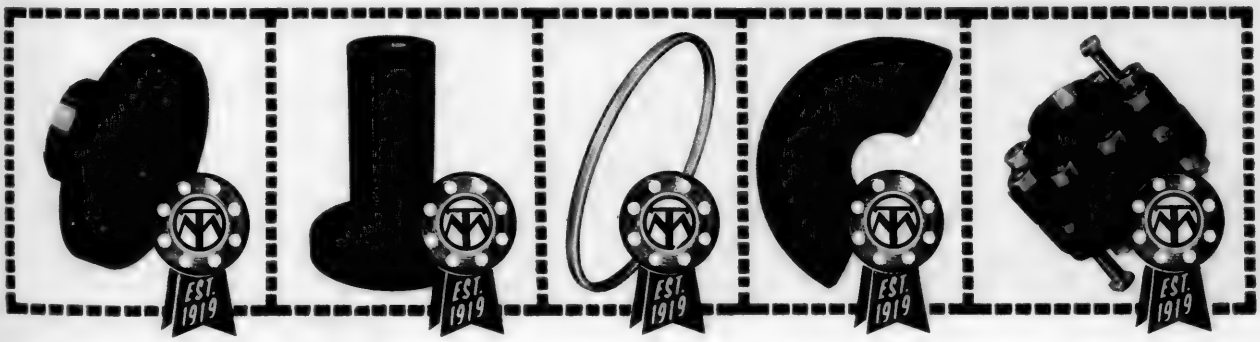
Thermal Energy of the Seas. The capture and conversion to useful energy of heat stored in sea water represents an ingenious application of the principle that heat can be converted to mechanical work when two heat reservoirs of different temperatures are available. Such reservoirs of enormous size are found in the sea in which the surface water is heated by the sun, and in certain areas maintained at sufficiently higher temperatures than deeper water for the difference in temperature to be utilized.

The basic machinery comprises an evaporator, turbine-generator, and condenser. The warm salt surface water enters a low-pressure vessel, in which a vacuum is created with an air gas extractor, and part of the warm water flashes into vapor. The steam thus produced is "inhaled" by a condenser cooled by cold water pumped up from a deeper layer. On its way, the steam drives an extremely low-pressure turbine which runs an electric generator. The condenser may be of the jet type, in which the steam mixes with the cold salt water, or it may be a surface condenser turning the steam into useful fresh water as a by-product.

The overall conversion efficiency varies with the temperature difference. For electricity production, the temperature difference between surface and cold water must be about 36 deg F which may require pumping from a great depth, and tremendous quantities of sea water must be used to produce a reasonable quantity of power.

Your BLUE RIBBON catalog is now available

THE MOST COMPLETE CATALOG IN THE INDUSTRY



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In Iron Body Wedge Gate Valves,
Outside Screw and Yoke Design,

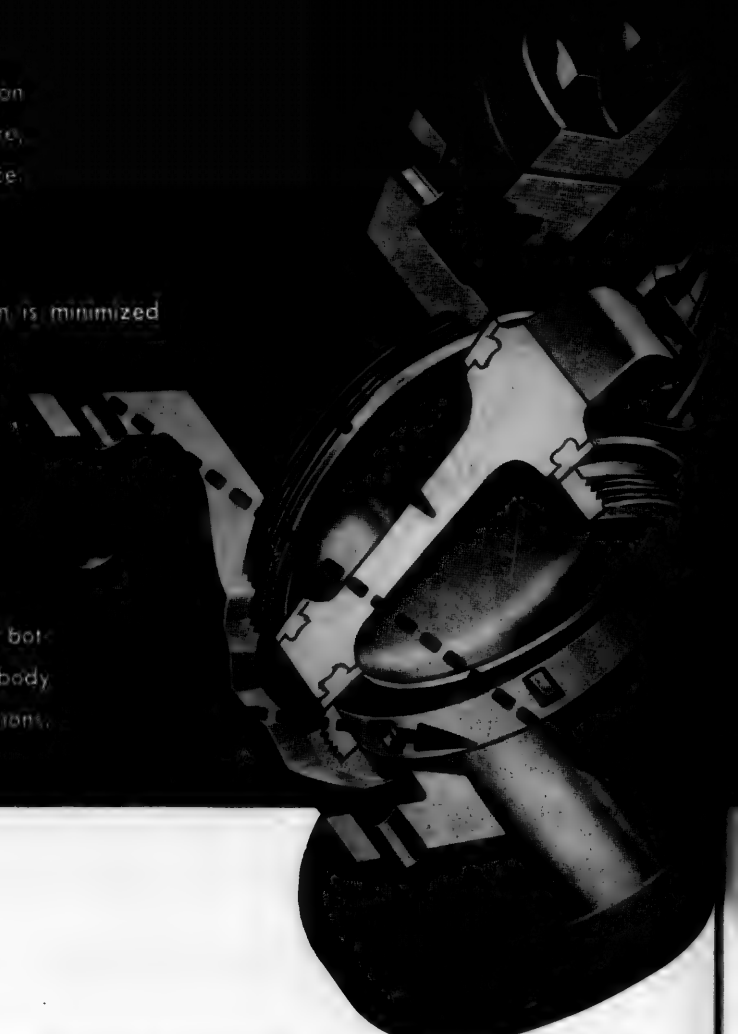
Walworth offers you these 8 outstanding advantages!

STRONGER CONNECTIONS. T head disc to stem connection on OS&Y types permits wedge to properly seat itself.

TIGHTER SEAL. Solid web type disc on OS&Y valves provides tight closure, greater strength and longer service.

REDUCED TURBULENCE. Fluid action is minimized due to this straight flow port design.

FEWER OBSTRUCTIONS. Seat rings of bolt-in seated types are screwed into body to prevent slum and grit accumulations.



*WALWORTH is a registered trademark of WALWORTH COMPANY

Walworth Subsidiaries: ALLOY STEEL PRODUCTS CO. • CONOFLOW CORPORATION • GROVE VALVE AND REGULATOR CO.

SURE-GRIP HANDWHEEL. Fluted design assures a sure grip, even with greasy gloves.

HIGH CORROSION RESISTANCE. Brass liner protects glands from deterioration and scoring.

EASIER REPACKING. Hinged gland eye-bolts on OS&Y valves permit fast maintenance under full pressure.

LESS DAMAGE. Bronze back-seat bushing in bonnet of OS&Y valves prevents scoring, guides stem accurately.

Walworth Iron Body Gate Valves are available with screwed or flanged ends, in sizes and types for every purpose. For full information see your Walworth Distributor or write *Walworth Company, 60 East 42nd Street, New York 17, N. Y.*

WALWORTH*

DISTRIBUTORS IN PRINCIPAL CITIES THROUGHOUT THE WORLD

M & H VALVE & FITTINGS CO. • SOUTHWEST FABRICATING AND WELDING CO., INC. • WALWORTH COMPANY OF CANADA, LTD.

CASE #101—Another case where General Electric Factory-Assembled Air Conditioning Units proved more economical than field-assembled systems.

Galt Ocean Mile Hotel—Fort Lauderdale's newest and largest, built by the Atlantic Const. & Eng. Co., Ft. Lauderdale—provides the finest, most luxurious and congenial accommodations—including General Electric Zone-by-Zone Air Conditioning.

GENERAL ELECTRIC **ZONE-BY-ZONE AIR CONDITIONING** SAVES FORT LAUDERDALE'S NEWEST, LARGEST HOTEL $50,000 INITIALLY—SPACE WORTH $3,000 ANNUALLY IN RENTALS

When the beautiful new Galt Ocean Mile Hotel, Fort Lauderdale, Fla., chose General Electric Zone-by-Zone Air Conditioning over a field-assembled central station system—it scored three ways in economy.

(1) Owing to simplified installation, an initial saving of $50,000 was accomplished. (2) Space saved is worth $3,000 a year in rentable room space. (3) Further savings are achieved through General Electric's individual zone control—enables management to cool only the areas it wants when it wants—servicing of one unit in no way interferes with the performance of the others. Meanwhile, the comfort, cleanliness and quiet operation of this General Electric system is one of the major guest-pleasing attributes of the hotel. This is another typical example of how General Electric Factory-Assembled units meet the most exacting air conditioning requirements economically and efficiently.

General Electric's complete line is flexible enough to meet every air conditioning need for all buildings—large or small—old or new. Ceiling-mounted units water-cooled up to 7½ tons—air-cooled up to 10 tons. Floor-mounted units—water-cooled up to 30 tons—air-cooled up to 20 tons. Steam and hot water coils available for all models. Discover how General Electric Factory-Assembled Units can simplify your planning. For full details write: General Electric Company, Commercial and Industrial Air Conditioning Department, Bloomfield, New Jersey.

Progress Is Our Most Important Product

GENERAL ELECTRIC

In Canada, Canadian General Electric Co., Ltd., Montreal

MINIMUM MAINTENANCE, LONG LIFE ASSURED BY THESE HEAVY-DUTY "BUFFALO" FANS

"Buffalo" Type "BLH" Fan
For Classes III & IV Service

"Buffalo" Type "BL" Fan
For Classes I & II Service

The high performance characteristics of these two outstanding "Buffalo" Fans has resulted in their widespread use in the field of industrial air handling. In addition to offering peak-efficiency operation in their respective classes, both the "BL" and the "BLH" bring you a bonus economy factor of *maintenance reduced to an absolute minimum* throughout a long, productive life. This minimum maintenance factor is directly due to unusually rugged "Buffalo" construction features such as:

HOUSINGS — The heavy gauge sides and scroll are of all-welded construction. Heavy structural steel bracing provides housing stiffness and rigid bearing support. Flanged inlets and outlets give added support.

SHAFTS — Hot-rolled or forged shafts are ground to close tolerances for perfect wheel and bearing fit.

WHEELS — Sturdy backward-curved blades are welded to the die-formed shroud and welded or riveted to the solid backplate. Heavy hubs assure permanent shaft alignment. For higher tip speeds, reinforcing rings provide necessary wheel rigidity.

BEARINGS — Self-aligning anti-friction bearings are designed for continuous operation at maximum tip speed. Horizontally split, ring-oiled, self-aligning, babbitted sleeve bearings are also available.

For full details, contact your "Buffalo" representative, or write for Bulletins F-102 and F-200.

Minimum maintenance is assured by the famous "Q" Factor — the built-in QUALITY that provides trouble-free satisfaction and long life in every "Buffalo" product.

"Buffalo"

BUFFALO FORGE COMPANY

480 Broadway • Buffalo, N. Y.

BUFFALO PUMPS DIVISION, BUFFALO, N. Y.

Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

VENTILATING AIR CLEANING AIR TEMPERING INDUCED DRAFT EXHAUSTING FORCED DRAFT COOLING HEATING PRESSURE BLOWING

PNEUMATIC TRANSMISSION

Pneumatics simplifies and improves centralized control of Air Conditioning— makes Control Centers easier to understand and operate

With pneumatic transmission by Johnson you can give your clients the benefits of control center instrumentation that is as simple and trouble-free as the pneumatic controls used elsewhere in the building!

Thanks to universal familiarity with pneumatic controls, operating personnel easily become expert in the operation of even the largest pneumatic control centers. No highly specialized training or extensive study is required.

Since pneumatic transmission functions with both fewer and simpler components, there are no complex, costly upkeep problems.

CONTINUOUS INDICATION

Pneumatic transmission offers other exclusive advantages that add greatly to ease of operation and efficiency of centralized control.

For example, only the pneumatic control center gives the operator continuous indication of key temperatures. With a separate pneumatic thermometer for each key point, he can check the entire system with a single glance. There are no buttons to push, no waiting for periodic logging, no codes to check.

NO SIDE EFFECTS

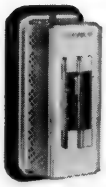
Likewise exclusive are control pressure gages that allow the operator to observe the operation and position of controlled devices at remote points. And, of course, only pneumatic systems are immune to the effects of humidities, temperatures, transient electrical currents, voltage fluctuations and other outside variables. This assures the extreme accuracy necessary for continuous, precision control.

CHOICE OF FEATURES

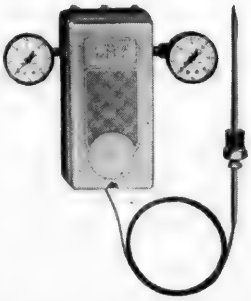
The use of pneumatic transmission for the centralized control of air conditioning and heating systems allows complete flexibility in the choice of control features. The Johnson line includes a wide selection of remote indicating, recording and controlling instruments, some of which are shown on the opposite page.

Pneumatic transmission as applied by Johnson offers you the same exclusive combination of accuracy, simplicity and superior performance that have long made pneumatic temperature control systems the standard everywhere. A nearby Johnson engineer will gladly give you more facts about these and other advantages of pneumatic control centers.

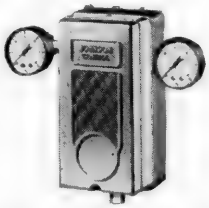
Johnson offers you Control Center instrumentation to meet the exact requirements of the individual installation



T-1210 Room Transmitter. Transmits space temperature to Control Center. Has highly sensitive, low-mass bi-metal measuring element. Temperature range is 50 F.



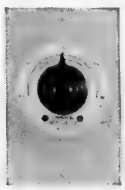
T-1220 Transmitter. Measures temperature in ducts, pipes, tanks, and other remote locations. Compensated, liquid filled measuring element. Ranges of 100 and 200 F available.



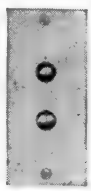
T-1270 Receiver Controller. Receives measurements from transmitter and either (1) controls directly, (2) resets remote submaster controllers or (3) acts as a remotely reset submaster to control as in (1) or (2).

T-1250 Pneumatic Thermometer. For remote indication of temperature as measured by transmitter. Available in a wide variety of sizes and ranges, with Fahrenheit or Centigrade scales.

G-201 Control Pressure Gage. Provides continuous remote indication of the operation of the controllers and position of controlled devices. An invaluable aid to operation.



S-222 Pneumatic Gradual Switch. Permits manual readjustment of the set point of remotely located instruments from the Control Center. Small, highly accurate, trouble-free.

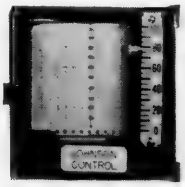


Pneumatic Push-Button Switch. May be used to start and stop fans, pumps and other electrical devices or to position any control device or equipment requiring two-position manual switching.

T-1000 Recorder-Controller. Furnished with powerful, high-accuracy measuring elements for temperature, pressure or relative humidity control applications. One-pen and two-pen models available.

Target Gage. Used in conjuction with Pneumatic Push-Button Switches to indicate operation of electrical equipment. Equipped with high visibility red or green fluorescent segments.

Miniature Indicating Controller. Conserves space on panels without sacrificing quality of control. A wide variety of easy to read scales and charts are available.



Miniature Recorder-Controller. Plug-in type, completely interchangeable with Miniature Indicating Controllers. For temperature or pressure control applications.

T-1050 Indicating Controller. For temperature, pressure or relative humidity applications not requiring a chart record. Master and submaster models available.

JOHNSON CONTROL

PNEUMATIC SYSTEMS

DESIGN • MANUFACTURE • INSTALLATION • SINCE 1885

JOHNSON SERVICE COMPANY
Milwaukee 1, Wisconsin

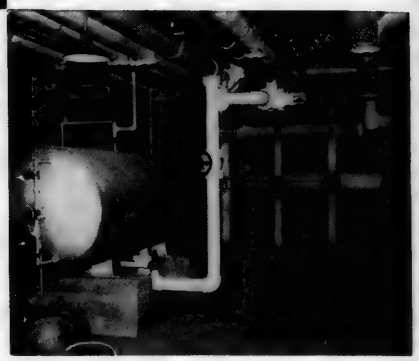
Please send Johnson Control Center Booklet S-103

Name & Title_____

Firm_____

Address_____

City & State_____



Plumbing and fire protection with

USS National Pipe—

St. Louis Federal Housing Project

USS NATIONAL Steel Pipe was used in the plumbing and fire-protection systems of the George L. Vaughn apartments —federal housing project in St. Louis, Missouri. Approximately 11,304 feet of pipe, ranging in size from ¾" to 8", comprises the systems in the four buildings.

In the plumbing systems, the pipe is used for hot and cold water supply mains and hot water return mains. In the fire-protection systems, an 8" main supplies water to each building, where there is a fire hose cabinet on each landing supplied by a 6" riser. A constant pressure of 100 psi is maintained throughout each fire-protection system.

Need first-quality pipe for air-conditioning, heating and power installations? Need seamless and standard pipe that will pay you back in outstanding service many times over for every dollar you spend for it? Then say "NATIONAL PIPE" every time. And, for further information or immediate assistance with your pipe problems, write to National Tube Division, United States Steel Corporation, 525 William Penn Place, Pittsburgh 30, Pa.

USS and National are registered trademarks

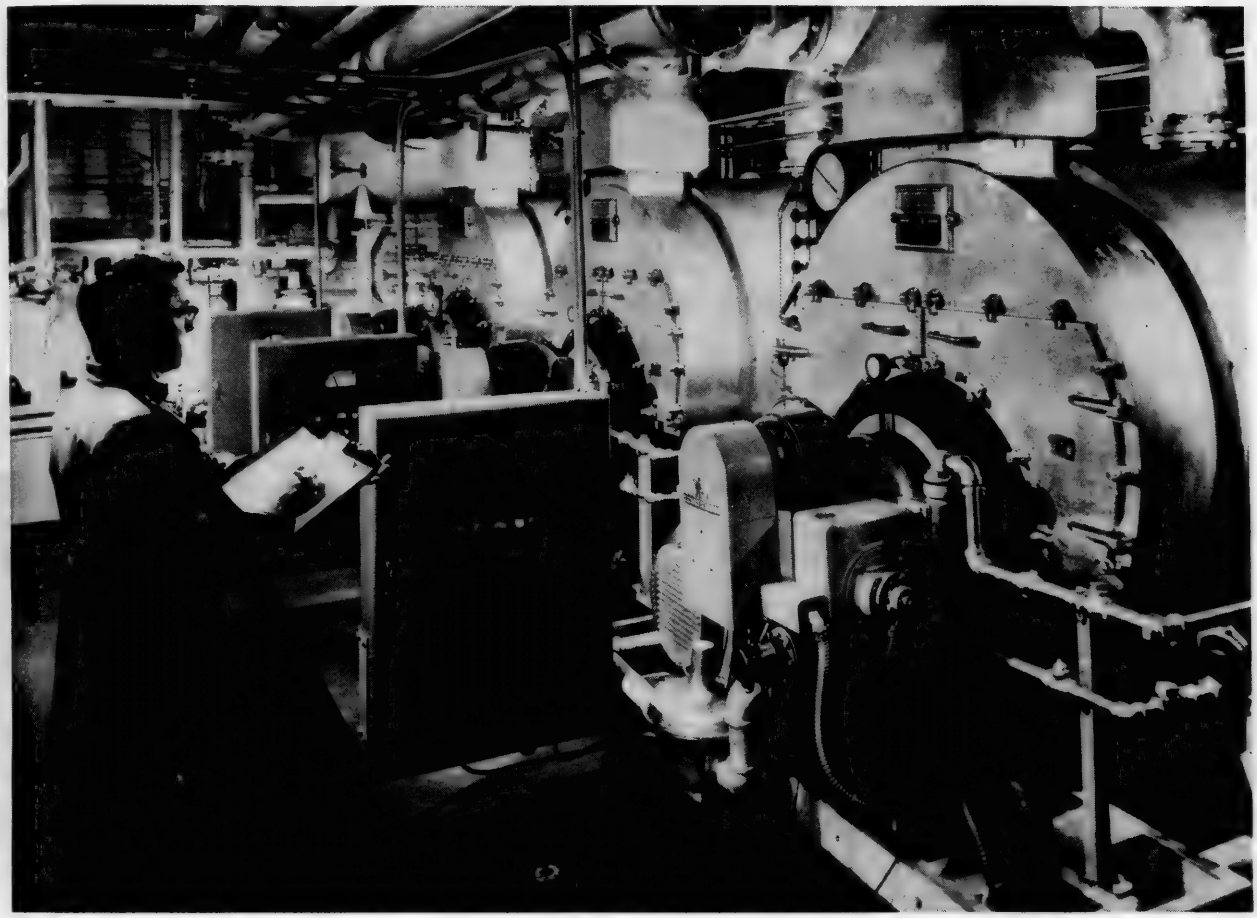
"The world's largest and most experienced manufacturer of tubular products—NATIONAL TUBE"

National Tube Division of USS United States Steel

Columbia-Geneva Steel Division, San Francisco, Pacific Coast Distributors • United States Steel Export Company, New York

The smart way to modernize

. . . specify your heating plant in one package



This remodeled boiler room serves the two buildings of the Columbus Dispatch newspaper plant, Columbus, Ohio. Fuels can be quickly changed in these three Iron Fireman-Kewanee gas-oil boiler-burner units. Consulting Engineers, John Paul Jones, Cary & Millar, Cleveland; Architect, Dan A. Carmichael, Columbus; Heating Contractor, Limbach Co., Columbus.

Iron Fireman burner with boiler — engineered as a single unit

These famous boiler-burner units are the products of two great specialists—each in its own field. They are engineered for each other. Included in one catalog, they can be ordered by a single model number from one set of specifications.

Plenty of reserve power

You can feel *safe* in specifying Iron Fireman equipment. These thoroughly engineered units are conservatively rated. The normal firing rate is a comfortable cruising speed—less strain, low maintenance, quiet operation, higher efficiency —and that big extra capacity is always standing by to pick up extra loads.

Compact and complete

These complete steam or hot water generating units require little more than service connections. Automatic controls, air and fuel systems are built in. No special boiler settings; low headroom; no high stack.

Please mail coupon for catalog and specifications.

IRON FIREMAN®

AUTOMATIC FIRING EQUIPMENT FOR OIL, GAS, COAL

IRON FIREMAN MANUFACTURING CO.
3069 West 106th Street, Cleveland 11, Ohio
(In Canada, 80 Ward Street, Toronto, Ontario)

Please send catalog and specifications on following equipment:

☐ Complete boiler-burner units
☐ Forced draft firing unit only

Name_____

Firm_____

Address_____

City_____ State_____

All-Air High Velocity System

provides versatile, draftless air conditioning for Smith-Douglass

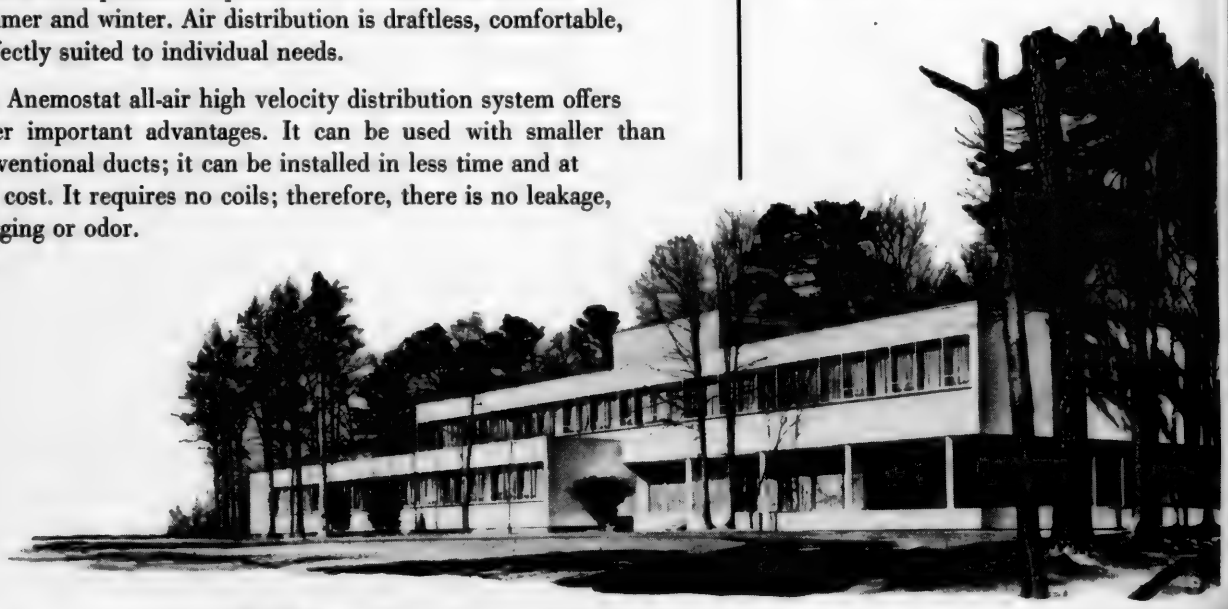
The new office building of the Smith-Douglass Company, leading fertilizer manufacturer, is fully air conditioned with a dual duct Anemostat all-air high velocity system.

Conditioned air is supplied to the Anemostat all-air high velocity units through two parallel ducts—one carrying cold air and the other warm air. The all-air high velocity units draw air from both ducts in any desired proportion to meet the temperature requirements for each area in both summer and winter. Air distribution is draftless, comfortable, perfectly suited to individual needs.

The Anemostat all-air high velocity distribution system offers other important advantages. It can be used with smaller than conventional ducts; it can be installed in less time and at less cost. It requires no coils; therefore, there is no leakage, clogging or odor.

ARCHITECTS—
Attention Please!

Anemostat round, square and straight-line diffusers used with high velocity units can be adapted to a wide variety of architectural designs.



This modern structure is located in Princess Anne County near Norfolk, Virginia.

Architect:
T. David-Fitz-Gibbon, Norfolk, Virginia

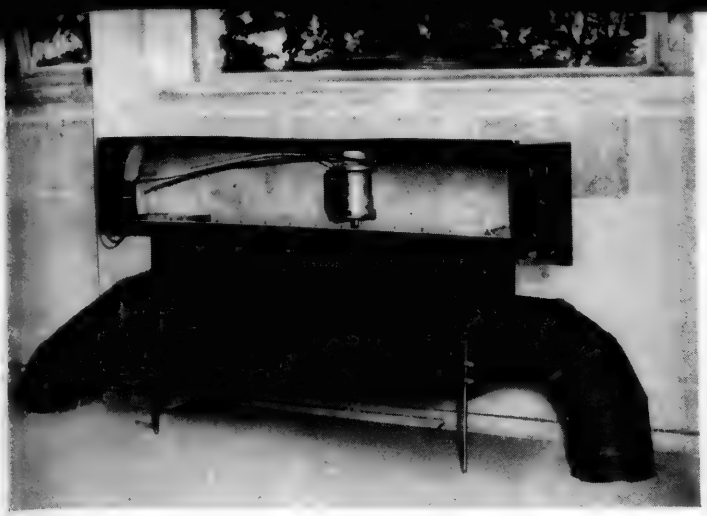
Design Consultant:
Thaddeus G. Crapster, New York.

Consulting Engineer:
J. Robert Carlton, Richmond, Virginia.

General Contractors:
Doyle & Russell, Norfolk, Virginia.

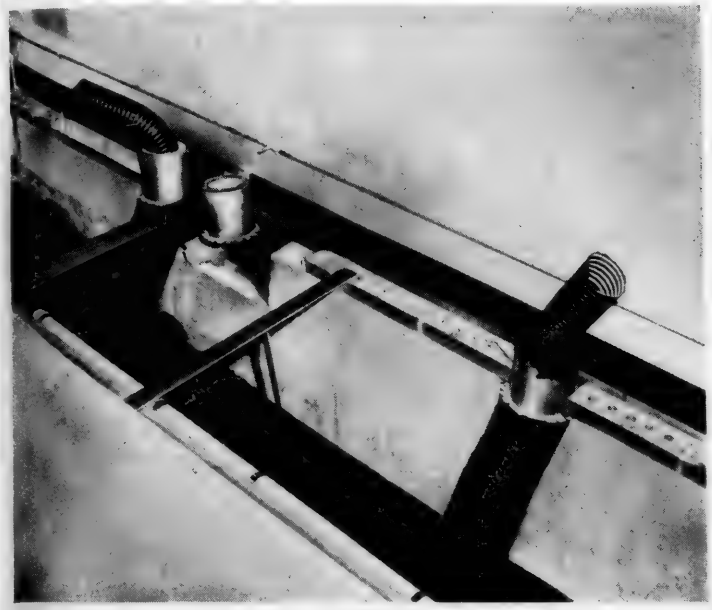
Mechanical Contractors:
B. & G. Olsen Company, Richmond, Virginia.

Anemostat all-air units form an integral part of the interior design and can be easily combined with built-in cabinets or bookcases.



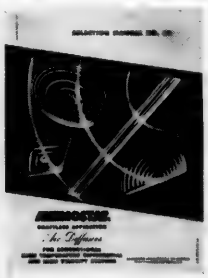
Anemostat UTW units before being enclosed.

Typical take-offs from main supply duct located in the floor. High velocity ducts can be buried in the floor.



Air is perfectly distributed in large meeting room by means of Anemostat ceiling air diffusers.

Meeting room of the Board of Directors.
Note Anemostat ceiling and under-the-window units.



Write on your business letterhead for your copy of

Anemostat®
Selection Manual 60

ANEMOSTAT CORPORATION OF AMERICA
10 East 39th Street, New York 16, N. Y.

Anemostat: The Pioneer of All-Air High Velocity Systems

"WE REDUCED INSTALLATION TIME 25%

with PITTSBURGH FIBER GLASS PIPE INSULATION"

says Mr. Charles W. Smith, President
Standard Insulation Products, Inc.
Baltimore, Maryland

strap fasteners.

"We installed 4,800 ft. of Pittsburgh Fiber Glass Pipe Insulation at Our Lady of Fatima School in Baltimore on water, steam and dual-temperature pipes. The handling ease and application speed of this product, compared with the insulation material previously used, saved us 25% in installation time costs.

"The three-foot lengths are easily spread by hand at the seam and are slipped quickly and snugly over the pipe. Hand stapling eliminated the need for metal strap fasteners. For special lengths, the insulation was easily cut with a knife. Wastage was negligible. Cut ends retained their shape with no fluffing. Short left-over pieces were used on fittings.

"The factory-applied vapor barrier eliminates condensation, which reduces future maintenance costs. Outside jackets present a good appearance and can be painted to match room decorations."

SAVE TIME WITH PITTSBURGH PIPE INSULATION

You can order Pittsburgh Fiber Glass Pipe Insulation in a variety of thicknesses and jackets to your own specifications. For complete information, call your nearest PPG Sales Office, or write to *Pittsburgh Plate Glass Company, Fiber Glass Division, One Gateway Center, Pittsburgh 22, Penna.*

PITTSBURGH PIPE INSULATION IS A PRODUCT OF THE FIBER GLASS DIVISION OF PITTSBURGH PLATE GLASS COMPANY

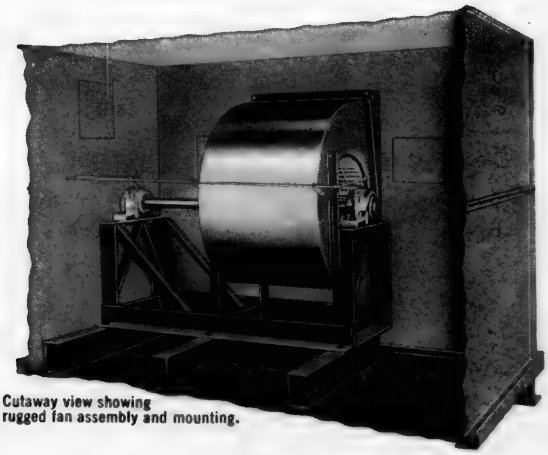
Sales Offices are located in the following cities: Charlotte, Chicago, Cincinnati, Cleveland, Detroit, Houston, Los Angeles, Minneapolis, New York Philadelphia, Pittsburgh and St. Louis

75th ANNIVERSARY 1883—1958 PPG

SYMBOL OF SERVICE FOR SEVENTY-FIVE YEARS

PITTSBURGH PLATE GLASS COMPANY

A new pace-setter



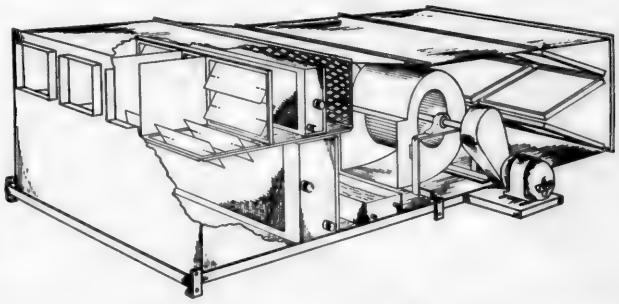
Cutaway view showing rugged fan assembly and mounting.

Clarage Hi-Static Multitherm for High Velocity Air Conditioning Systems

INTRODUCED IN 1955 by Clarage, this new line of Draw-Thru type units fully answers the requirements of conduit type systems where high duct velocities and pressures to 8" static are involved.

FIRST INSTALLED IN 1956 in the Pennsylvania Lumbermen's Mutual Insurance Building, Philadelphia. Since then numerous Clarage Hi-Static Multitherms have been specified and used because of stable, efficient operation. Request Bulletin 1312 covering the 7 sizes, capacities 2,500 to 22,000 CFM.

Still a pace-setter



Clarage Blow-Thru Multitherm for Central Station Zone Control Air Conditioning

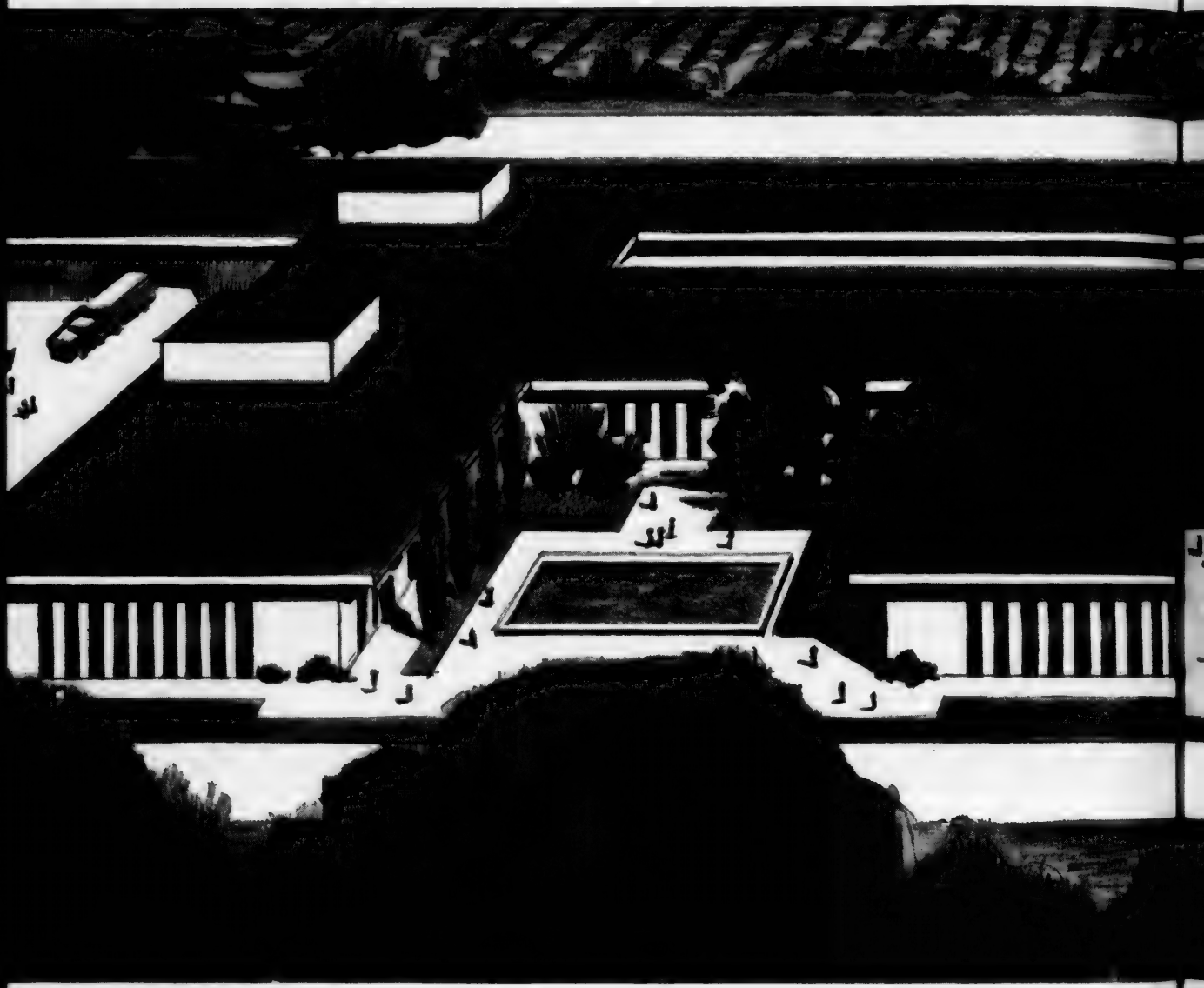
INTRODUCED IN 1939 by Clarage, the pioneer and perfecter of this type of equipment. A single Blow-Thru Multitherm Unit can handle as many as 8 different zones for different area requirements.

FIRST INSTALLED IN 1940 in the Northern Indiana Brass Co. office building, Elkhart. Over 1000 Clarage Blow-Thru Multitherms have now been installed the nation over—selected because of their unique feature of *mixing* hot and cold air to prevent stratification... their quiet, economical, dependable performance. Request Bulletin 1310 covering the 12 sizes, capacities to 12,000 CFM.

CLARAGE ... *dependable equipment for making air your servant*

SALES ENGINEERING OFFICES IN ALL PRINCIPAL CITIES • IN CANADA: Canada Fans, Ltd., 4285 Richelieu St., Montreal

...NOW WE'RE



Specify Arkla-Servel Gas Air Conditioning and you specify years of trouble-free comfort

With the new Arkla-Servel Gas Absorptive Cooler, your clients will get extra—even exclusive—advantages that they'll get *only* with a gas cooling system.

Only gas gives these important advantages:

. . . High efficiency at *all* times—even during the light loads.

. . . Constant temperature control.

. . . Modular adjustment of capacity (instant automatic adjustment to match actual cooling requirements).

. . . Dependability of fuel service at all times.

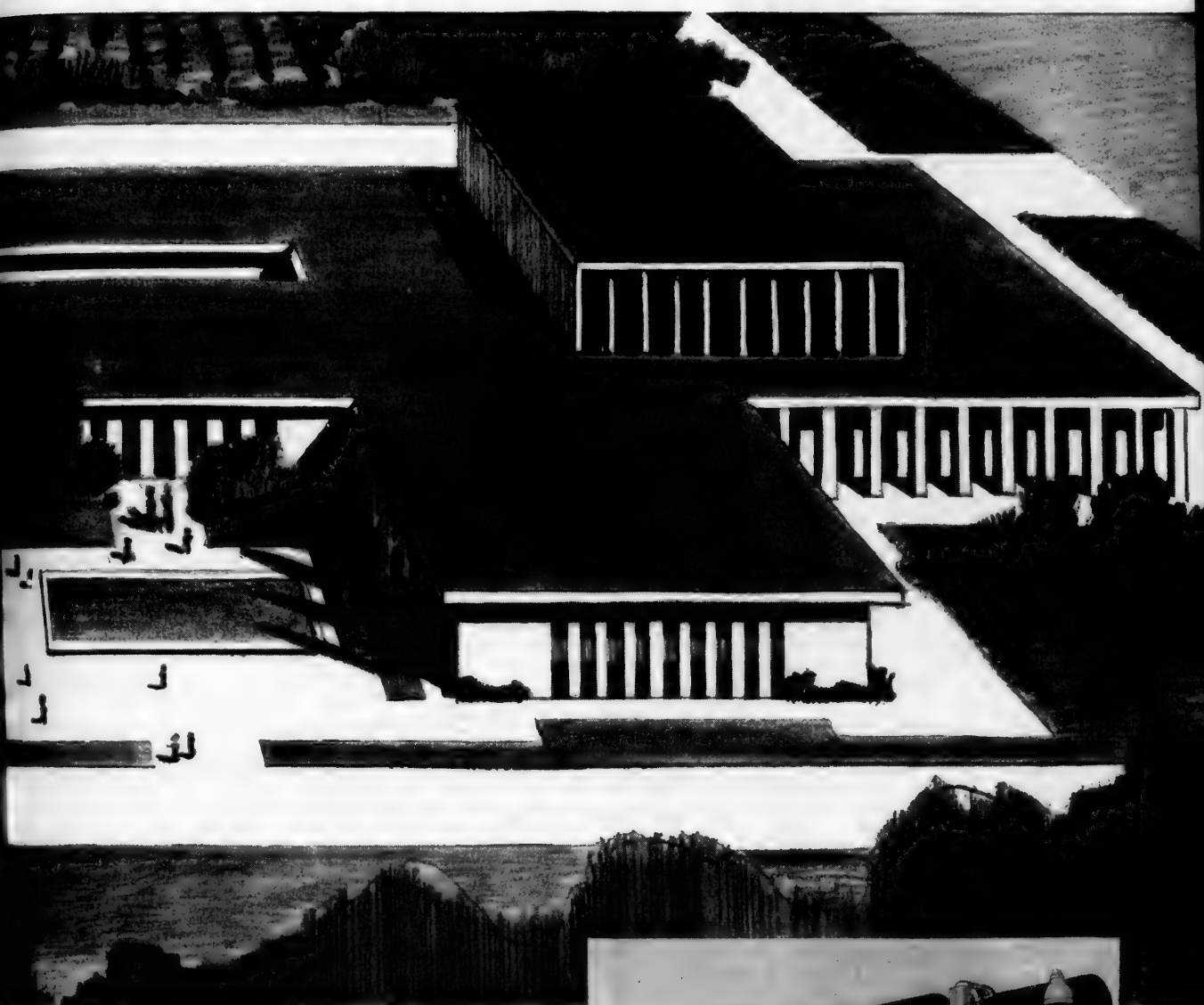
The 25-Ton Arkla-Servel Cooler

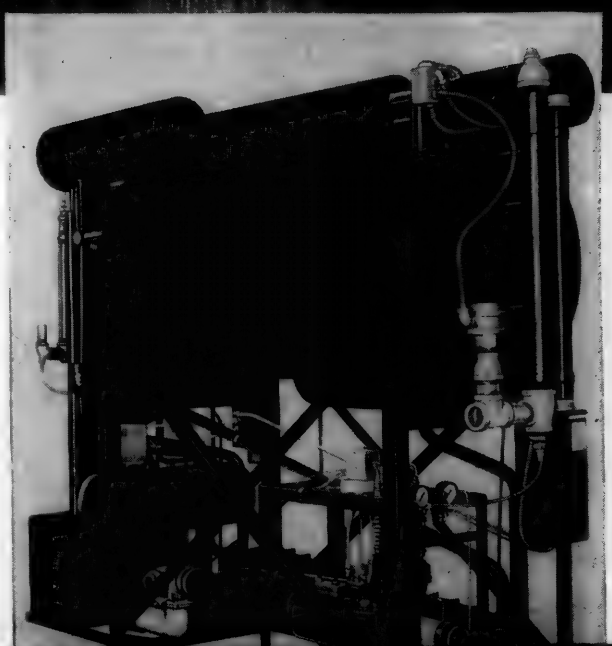
. . . A compact unit, easy to install and light enough for rooftop installation.

. . . Costs are low for installation, operation and maintenance. No specially trained operating or maintenance personnel are required.

. . . Can be installed singly or in banks to fit any size installation.

COOLING WITH GAS





Gas absorptive cooling can put your commercial and industrial clients' heating plant on a year around paying basis. It utilizes low pressure steam to cool water, has no moving parts to wear out, and provides quiet, economical operation. What's more, it's *vibration-free.*

Take advantage of the consulting free services provided for you by your gas company. They have trained specialists who have been working with contractors and builders for years. They belong to your associations or affiliations and are familiar with your problems. Check the facts about gas and you'll see—modern gas air conditioning out-performs all other fuels. *American Gas Association.*

Completely recessed into the wall

new dimension

...in shower control!

THE *Recesso*

thermostatic shower mixing valve...

The only shower valve that's built into the wall for complete safety... most striking appearance.

NO PROTRUDING EDGES to cause bodily injury in case of shower falls.

POSITIVE PROTECTION against accidental scalding.

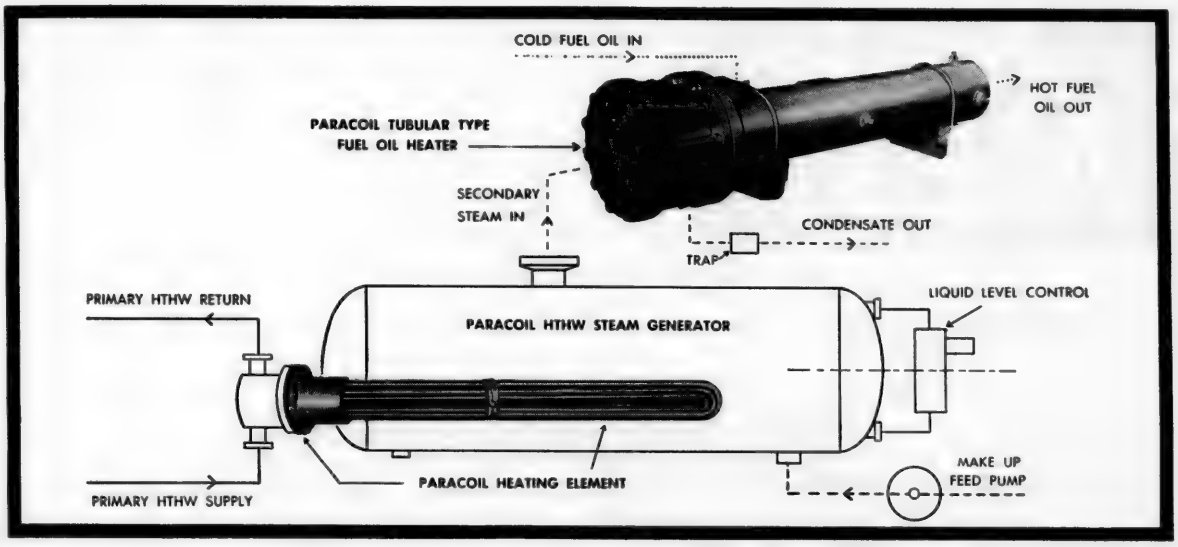
SMARTEST DESIGN... clear, clean recessed design is happily at home in the most luxurious shower installations.

Another Quality Product of

THE *Lawler Line* OF THERMOSTATIC CONTROL VALVES

LAWLER AUTOMATIC CONTROLS, INC.
Mt. Vernon, N.Y.

Idea no. 1 from Paracoil



How to use secondary steam to pre-heat no.6 oil in a High Temperature Hot Water system

Paracoil engineers know that the first consideration in the design of an oil preheating system for an HTHW installation must be absolute freedom from the possibility of oil leak contamination of the main HTHW stream. A completely isolated oil preheater circuit is recommended. This can be accomplished by means of a secondary heat transfer circuit that does the actual heating. In this way, only the secondary circuit is exposed to possible contamination — the main HTHW circuit is protected at all times.

One of the ways that this isolation is achieved is illustrated above. Additional isolation circuits will be commented upon in future "Idea Sheets". Watch for them!

How to design a protective circuit

1. **Install a steam generator.** Use a Paracoil Heating Element with the HTHW main energy stream as its heat source. With water at 350° F, steam at 25 psig (267° F) can be easily generated in an economically sized unit.
2. **Use the steam thus generated** . . . to heat the fuel oil in a Paracoil Tubular Oil-Type Fuel Oil Heater.* This type heater provides the highest rate of heat transfer — more than **three times** that of the conventional straight tube type.
3. **The condensate from the oil heater** . . . may be returned to the steam generator or sent to waste depending upon plant policy. If the re-use of the condensate is important, absolute surety of its quality can be obtained through the use of the Paracoil Oil Leak Condensate Inspection System.*

Paracoil engineers have designed and built many oil preheater protective systems for both stationary and marine installations. They now offer their experience and know-how to all who are involved in HTHW activities.

Write for complete data.

DAVIS ENGINEERING CORPORATION

30 Rockefeller Plaza, New York 20, New York • Circle 6-5650

CUT ALONG DOTTED LINE AND SAVE

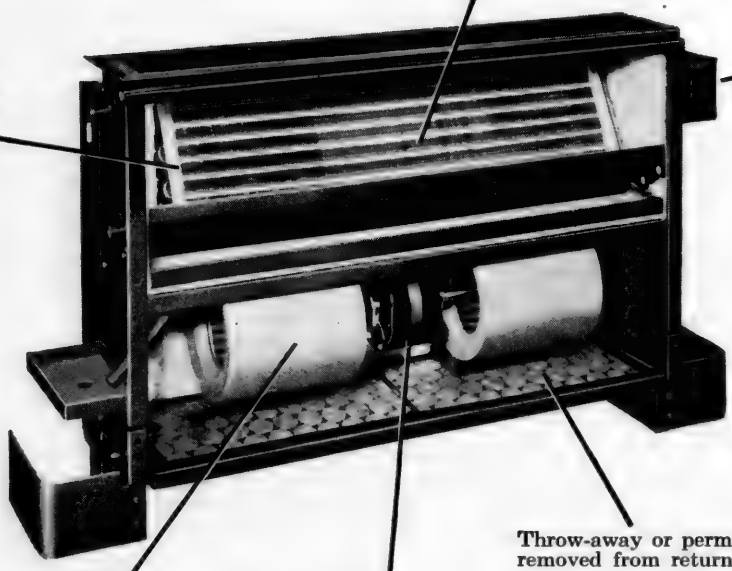
ALL NEW AMERICAN

FAN-COIL-TYPE

Universal coil—provides summer cooling and dehumidifying with chilled water, and hot-water heating in winter

Reversible coils—easily removed on the job for opposite-hand connections

Individual room control readily accessible

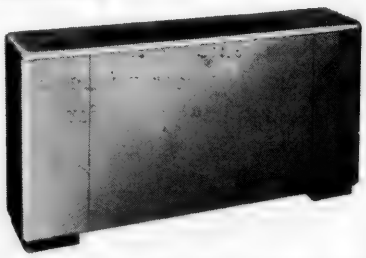


Available in four sizes: 200, 300, 400, and 600 cfm

Throw-away or permanent filters easily removed from return-air opening without removing casing

Motor furnished with 3-speed control

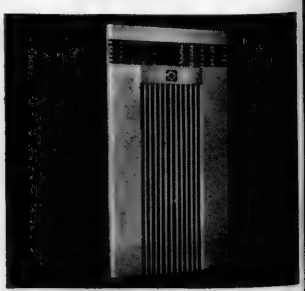
Lightweight aluminum fans provide long bearing life



Enclosure for Diaflo room air conditioner is made of furniture steel, and can be furnished in a tan-primer or leathertex-enamel finish.

Tonrac® Centrifugal Refrigeration Machines maintain constant chilled-water temperature regardless of load. Advanced design, quiet operation.

Type AB Multi-Zone Unit. Single arrangement provides either vertical or horizontal blow. Designed for either low-pressure or high-pressure systems.



American Blower Packaged Air Conditioners. Sizes from 3 to 20 tons. Air- or water-cooled models for use with or without ductwork.

BLOWER DIAFLO®

UNIT AIR CONDITIONERS

Diaflo units are designed, engineered, and manufactured to meet the professional requirements of each member of the building team

Architect

"They provide the design flexibility and pleasing appearance an architect likes in a unit air conditioner. They adapt readily to both new and existing buildings, with a choice of lengths to fit modularly spaced partitions. Diaflo units are completely suitable for new curtain-wall-type buildings or for other types of construction."

Consulting Engineer

"They're versatile mechanically, too, with rugged, heavy-gauge construction. Two basic units permit either vertical or horizontal installation. Front or top discharge is available on vertical unit. Universal coil permits summer cooling with chilled water, and winter heating with hot water. Coil is suitable for manual, electrical, or pneumatic control."

Mechanical Contractor

"Diaflo units provide a really 'clean' installation. Base unit is easily mounted with free access on both ends for all connections. Installer can work freely without being cramped. This saves time and money. Then just prior to start-up, clean, undamaged enclosure can be hung in place."

Owner

"Diaflo units certainly fit the requirements of modern building air conditioning. They harmonize well with practically any interior decor—are quiet, draft-free, and permit room occupants to select their own temperature. Maintenance is economical, too. Filter removal is easy, and there is ready access to all controls."

You can pinpoint responsibility for equipment performance, delivery dates, user satisfaction on any air-conditioning system you plan by using American Blower equipment . . . the complete line that's designed, engineered, and manufactured to work together.

And 73 branch offices offer local product help or nation-wide sales-service coordination. American-Standard,* American Blower Division, Detroit 32, Michigan. In Canada: Canadian Sirocco products, Windsor, Ontario.

*American-Standard and Standard ⊕ are trademarks of American Radiator & Standard Sanitary Corporation.

AMERICAN-Standard

AMERICAN BLOWER DIVISION

All

WATERLOO

Registers and Grilles are tested and approved by

ANEMOSTAT®

Laboratories

TESTED • APPROVED • ANEMOSTAT CORPORATION OF AMERICA

This smoke test picture, illustrating the exhausting of room air through Waterloo style 3H Return Air Grille, was taken in the Anemostat Laboratories in Hartford, Connecticut. It is one of a series of tests conducted by Anemostat research engineers to insure maximum efficiency of Waterloo equipment. In installations throughout the country, Waterloo registers and grilles are used with Anemostat air diffusers — a combination that results in top-quality performance.

Waterloo supply registers and grilles feature the exclusive silent flow "tear drop" louvre design. They are manufactured in a modern plant using the most efficient techniques, and every Waterloo unit is backed by 56 years of experience in air conditioning, heating and ventilating applications. • These, plus Waterloo's wide range line and fast service on specials, are good reasons why it pays to install Waterloo units in your next job.

Write for Waterloo Catalog, containing complete data.

WATERLOO

REGISTER CO., INC.

WATERLOO, IOWA

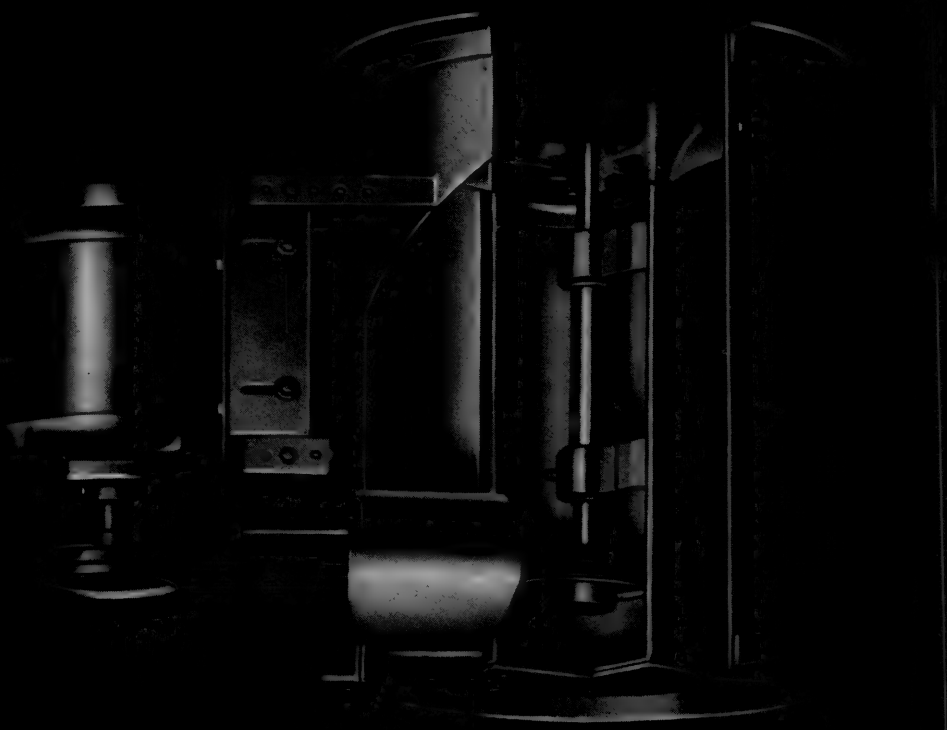
WR-103

REGISTERS • GRILLES • VOLUME CONTROL DAMPERS • DOOR VENTILATORS

When you need

axial flow fans

for exhaust of fumes and vapors...



FOR
STANDARD AIR
CORROSIVE GASES
ELEVATED TEMPERATURES

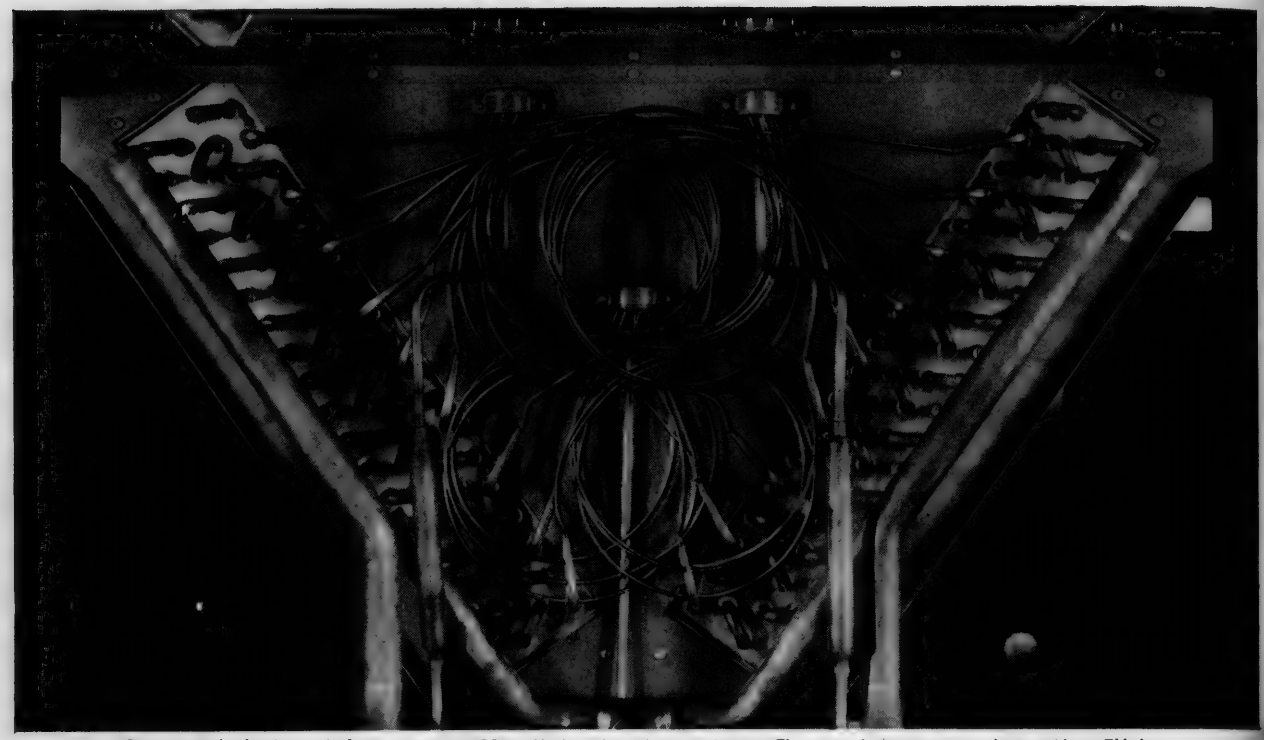
Specify Westinghouse Tubeaxial Fans complete with motor and V-Belt Drive ready for "in-line" mounting in duct or stack

Call your nearest Sturtevant Division Sales Engineer, or write Westinghouse Electric Corporation, Dept. E-6, Hyde Park, Boston, Massachusetts.

J-80641

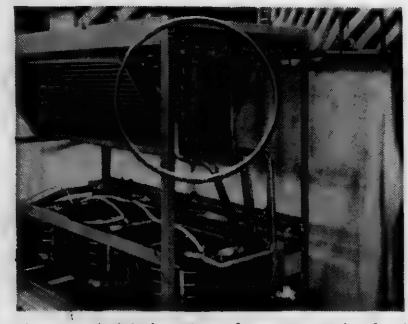
YOU CAN BE SURE...IF IT'S

Westinghouse



Restrictor tube feed at end of evaporator in a 25-ton York packaged air conditioner. There are three systems, each served by a 7½-hp hermetically sealed compressor unit with a water-cooled condenser—making possible step-start and step-capacity operation.

York uses restrictor tube metering in units up to 25 tons—depends on clean, uniform restrictors



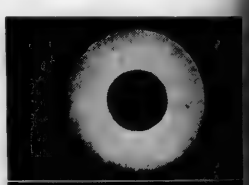
Area circled is location of restrictor tube feed shown in photo above.

RESTRICTOR TUBES, in 38 different combinations of length and diameter, play a vital role in packaged air conditioners produced by York Corp., a subsidiary of Borg-Warner. York pioneered in the air conditioning application of hermetically sealed refrigeration systems, which it uses in units up to 25 tons in cooling capacity. And these systems utilizing restrictor tubes for the metering of the refrigerant, eliminating moving control parts, have greatly reduced field service and made possible the 5-year protection plan on all units.

For dependable operation—and for economical manufacturing—York must have restrictor tubes that are clean and uniform, batch after batch. Anaconda restrictor tubes have been consistently meeting these requirements.

Consistently high quality. All Anaconda Restrictor Tubes are plug-drawn to finish. Extreme care is exercised in making the steel plugs, in order to produce a smooth, round inside bore as shown in the cross-section micrographs, right. Every length is chamfered at both ends, inside and out. Each tube is thoroughly washed and blown out, given a final airflow test, carefully bundled, with ends of each bundle wrapped. Your range of selection is broad, as Anaconda Custom-Made Restrictor Tubes are made in both copper and aluminum, in nominal inside diameters from .025 inch to .090 inch.

Write today on your company letterhead for the free Anaconda Air Flow Slide-Rule Calculator. Address: French Small Tube Division, The American Brass Company, Box 1031, Waterbury 20, Connecticut.



A cross-section of an Anaconda Copper Restrictor Tube, .081" O.D. x .031" I.D., magnified 10X. Note the roundness of the bore.

Section of a micrograph at 200X magnifications to show smoothness of the bore.

ANACONDA®

RESTRICTOR TUBES

Made by French Small Tube Division *of* The American Brass Company

ANACONDA PRODUCTS FOR THE REFRIGERATION AND AIR-CONDITIONING INDUSTRY

HIGH VELOCITY

PRODUCT: UNIT TYPE: MPW-50"

DATE: 11-10-57

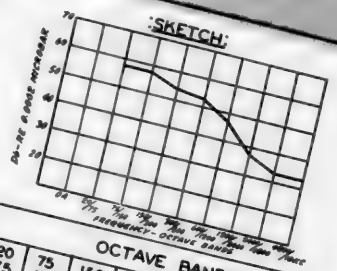
TIME: 10 20 AM

SIGNED: WB

MICROPHONE LOCATED ON UNIT & 6" OUT, 24" HIGH, IN FREE FIELD

CABLE CORRECTION: ADD +3 db

SKETCH:



COLD DUCT			HOT DUCT			FAN S.P.	FAR FIELD			FREE FIELD			OCTAVE BANDS							
CFM	ΔP	S.P.	CFM	ΔP	S.P.		A	B	C	A	B	C	20 75	75 150	150 300	300 600	600 1200	1200 2400	2400 4800	4800 9600
150	.091"	2.0	0	0	5.5	5.5"	37	43	53	44	50	57	55	51	45	44	41	34	27	27
200	.160"	2.0	0	0	5.7	5.7"	38	45	53	46	53	59	57	55	50	48	44	35	29	27
250	.250"	2.0	0	0	6.1	6.1"	41	47	54	51	58	62	58	58	54	53	48	38	33	33
300	.390"	2.0	0	0	6.3	6.3"	44	49	55	56	62	64	62	62	59	58	54	46	40	35
350	.520"	2.0	0	0	6.5	6.5"	47	51	56	60	65	67	63	64	62	62	58	50	45	36

BACKGROUND:

Now available from TUTTLE & BAILEY...

the first sound power ratings based on octave band analysis for air distribution devices

Sound power levels by octave bands have been scientifically established by Tuttle & Bailey for their air distribution devices. These ratings, the first in the history of this segment of the industry, were worked out by Tuttle & Bailey engineers in their own sound laboratories. They conform to the theory of sound evaluation published in the 1957 ASHAE Guide,

These T & B ratings were prepared as a contribution to the solution of the whole air distribution noise problem

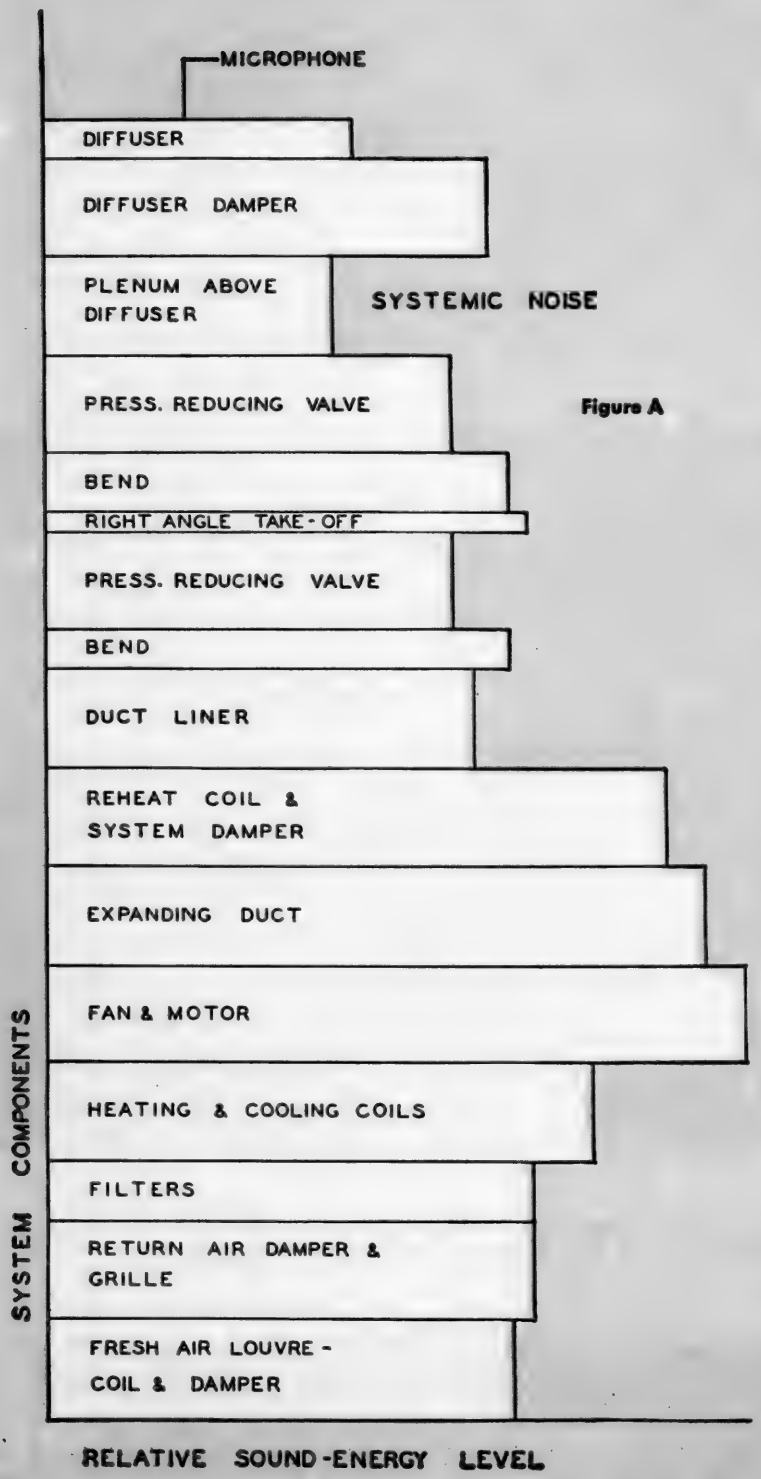


Figure A

A widespread notion has long existed that noise entering an occupied room from an air distribution system is the fault of the outlet manufacturer. Nothing could be further from the truth. The real problem is total systemic noise—the one audible sound which is produced when all of the noises generated in the system by its various components are added together.

Generally the major source of noise in an air distribution system is in the fan room. In this area, outside noises can enter the system through fresh-air intake louvers; and such equipment as refrigeration compressors, condensate pumps, return and exhaust fans, fan motors and most importantly the supply fan itself can add noise to the air being discharged into the duct system.

Other factors that influence the noise control problem are: heating or cooling coils, duct transformations, duct liners, duct work construction, bends, dampers, take-off connections, and the acoustical qualities of the occupied room in terms of room volume and surface absorption.

The noise problem in low- or high-pressure systems differs only in magnitude. Effects on the noise level output produced by each component, with changes in static pressure and air velocity, will vary in magnitude for every air distribution system, but the basic problem will always remain the same.

The total noise generated by all components can be reduced by the use of Tuttle & Bailey sound attenuation units located at the point of air distribution terminals in a high-pressure system.

What happens to sound energy as it leaves the fan and travels by air path along a duct system is illustrated in Fig. A. The height of the bar represents fre

quency distribution and the length of the bar represents intensity. The lengths of the blocks indicate the relative growth or decay of sound energy levels as the sound field passes each component in the system. The columns, therefore, increase or decrease in height depending upon whether all frequency components or equivalent broad-band energy are present or whether only certain predominant frequencies are registered.

The relative sound power and sound pressure levels will vary with frequency, and different components will either add or subtract noise from the system in certain frequencies (Fig. B). Frequency in cycles per second is plotted horizontally with a scale of decibels plotted vertically. Each curve delineates the sound-energy distribution as a function of frequency for each major component. In the overall noise produced by an air distribution system there are certain sound frequencies which interfere with speech communication. High noise intensity in the speech interference range (600-4800 cycles per second) can produce occupant discomfort. The final system design curve should be less in the speech interference range than the curve showing the selected room criterion.

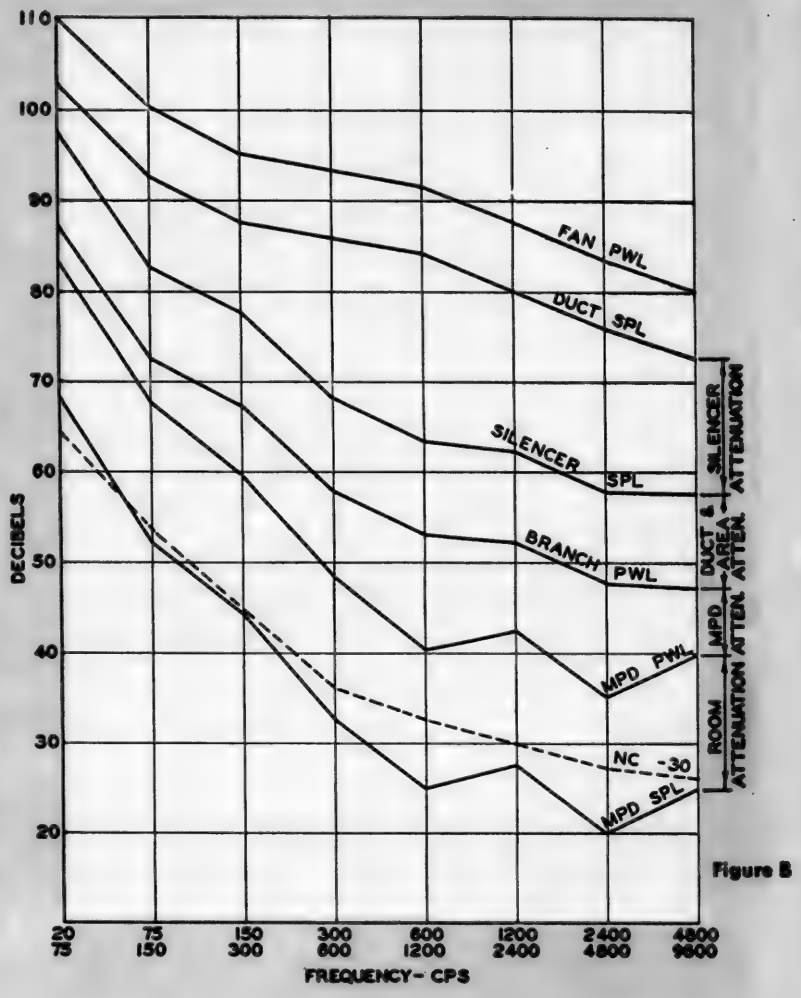


Figure B

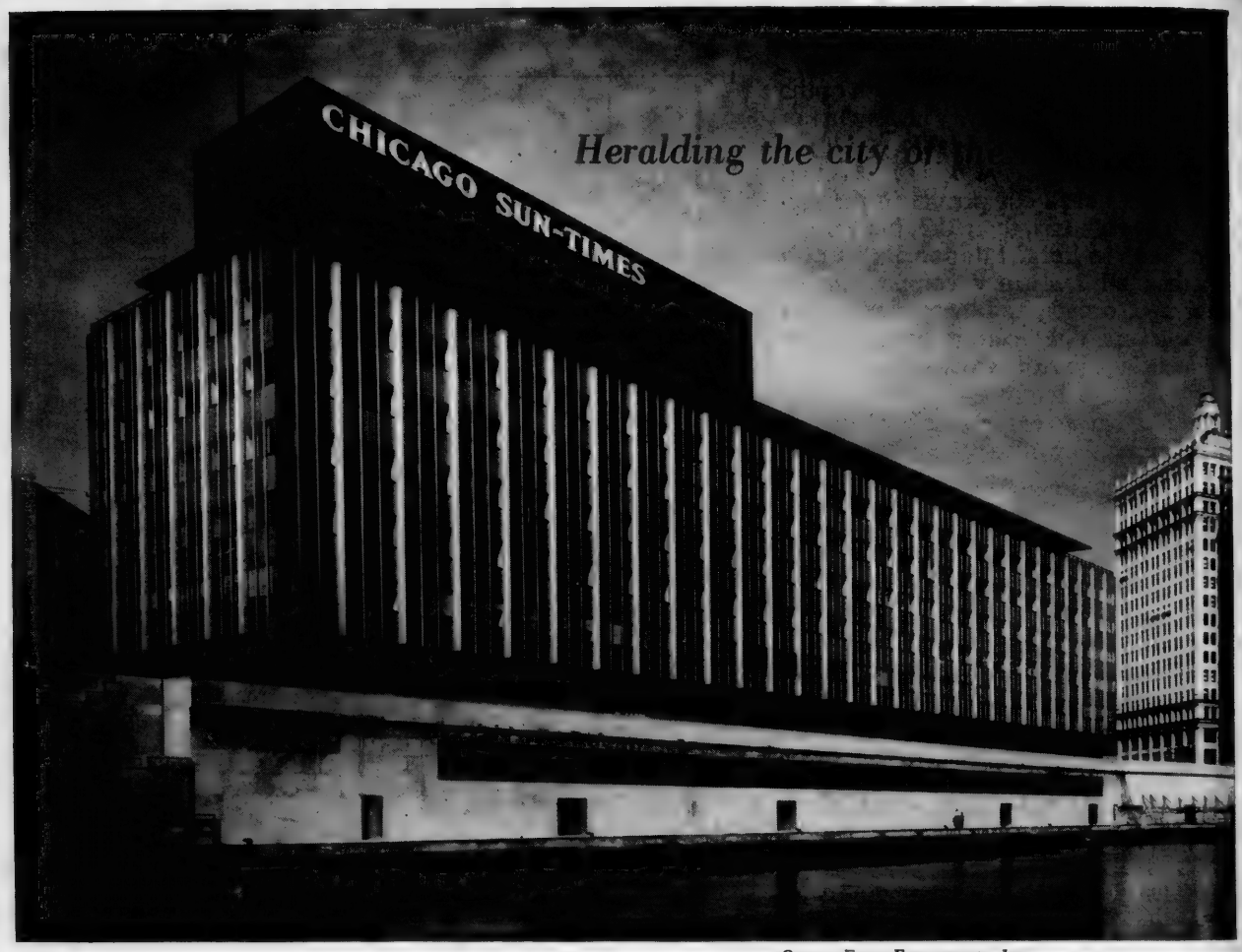
For further information on the sound level ratings of Tuttle & Bailey equipment or for help in solving a specific air distribution problem, address: Engineering Department, Tuttle & Bailey, New Britain, Connecticut.

TUTTLE & BAILEY

division of Allied Thermal Corp. New Britain, Connecticut

On the West Coast: TUTTLE & BAILEY PACIFIC, INC., City of Industry, California

A complete line of air distribution equipment and accessories for low- and high-pressure systems.



Owner: FIELD ENTERPRISES, INC.
Architects-Engineers: NAESS AND MURPHY
General Contractor: GEORGE A. FULLER COMPANY
Plumbing Contractors: G. F. CONNELLY CO.
Heating Contractors: KROESCHELL ENGINEERING CO.
Air Conditioning Contractors: WILLIAM A. POPE COMPANY

NEW CHICAGO SUN-TIMES BUILDING

equipped with long-lasting, dependable JENKINS VALVES

IN ADVANCED PLANNING, as in location and design, the new Sun-Times Building is front-page news. For this is the first project to be completed in a development which will transform the area north of Chicago's Loop into a city of the future.

There can be only one basis for selecting physical equipment for such a plant: the ability to perform efficiently and economically *for years*. This is why Jenkins Valves are standard on all plumbing, heating and air conditioning lines in the block-long structure.

The extra measure of performance and reliability built into Jenkins Valves has for generations assured long operating life and low maintenance cost. That's well to remember when you specify valves . . . especially since the valves that bear the famous Jenkins Diamond mark *cost no more.* Jenkins Bros., 100 Park Avenue, New York 17.

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10" Fig. 651-A Jenkins Iron Body Gate Valve, fitted with by-pass, on suction line of pump which supplies Chicago River Water as condenser water and process water for type foundry requirements.

JENKINS
LOOK FOR THE JENKINS DIAMOND
VALVES
JENKINS
SINCE 1864
Jenkins Bros.

When you need heating and cooling coils...

these are better

because of this!

Air Activating Guides

This Westinghouse fin design activates air ... does away with dead-air film

All Westinghouse continuous Plate-Fin Coils feature:

- *Permanent Mechanical Bond—Fin to Tube*
- *Minimum Air Resistance*
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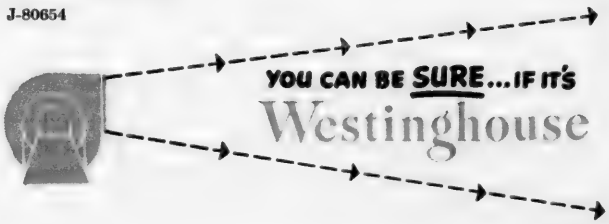
And for heavy-duty industrial process and high-pressure steam heating . . . standard sections with extra-heavy wrought-iron finned pipe are available.

Call your Sturtevant Division Sales Engineer for complete details on your heating and cooling coil requirements, or write Westinghouse Electric Corporation, Department E-6, Hyde Park, Boston 36, Massachusetts.

J-80654



Know-how makes the

IN INSTALLATION AND SERVICE ENGINEERING

Dravo's new *Counterflo* is the only industrial space heater backed by a world-wide organization. The map gives you an idea of the number and location of the qualified heating engineers, sales and service offices, representatives and foreign licensees who form this global network.

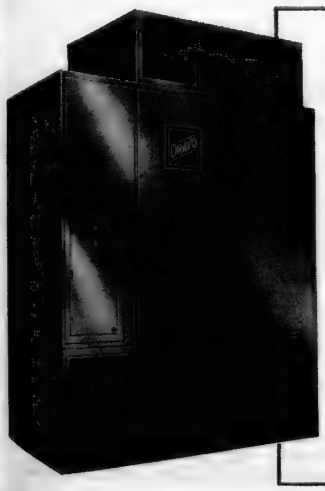
This means that a *Counterflo* owner not only has outstanding heater performance, but also a highly trained, factory-schooled service organization on 24-hour call. Should the need arise, service, for both installation and maintenance, is as close as your telephone. Dravo's wide-spread field activity is supplemented by the Pittsburgh staff, who stand ready to fly to any part of the country immediately.

This is just one of the many outstanding benefits available with your new *Counterflo*. For more information, write for Bulletin 564. Address DRAVO CORPORATION, DRAVO BUILDING, PITTSBURGH 22, PA.

DRAVO

CORPORATION

difference



5 REASONS WHY THE DRAVO COUNTERFLO IS YOUR BEST SPACE HEATER BUY

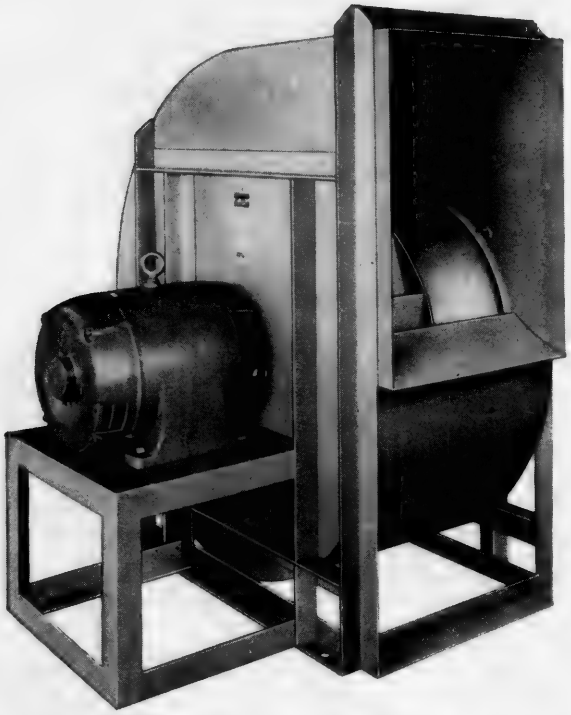
NEW PYROJET BURNER—exclusively Dravo—first burner developed specifically for direct-fired space heaters. Burns low cost oils efficiently. Switches from gas to light oil automatically.

NEW INDUCED DRAFT FIRING—automatically controls fuel/combustion air ratio, high negative pressure in combustion chamber adds extra safety; extra efficiency because of complete control of combustion air.

NEW AIRFOIL COMBUSTION CHAMBER—stainless steel, ribbed for extra strength and channeling of airflow—guaranteed for 10 years. Longest possible flame travel for complete combustion within primary heat transfer area.

NEW LOW-SPEED FANS—forwardly curved, low-speed, double inlet fans with high efficiency reduce horsepower requirements in the new Counterflo drastically, operating costs are lower.

NEW DISCHARGE PLENUM—distributes heated air at high velocity without annoying drafts. Adds new flexibility to warm air distribution patterns.



WHEN DIRECT DRIVE VENTILATION EQUIPMENT IS DESIRED . . .

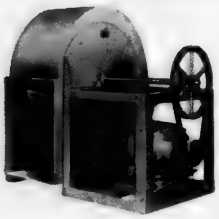
Specify *Peerless-Electric*® Non-Overloading Direct Drive Blowers

Tested and rated to AMCA specifications. All-welded wheels statically and dynamically balanced. Motor base, frame and housing completely welded together for added strength on larger sizes. 12½" to 36½" wheel diameters. 1,110 to 24,560 c.f.m.

No obstruction at inlet. Air enters blower wheel through smooth, spun venturi, passes quietly through wheel and discharges over airfoil cutoff. Peerless-built, self-limiting horsepower motor prevents overloading at any condition.

Write for catalog No. 215 today

Peerless-Electric® NON-OVERLOADING BELT DRIVE UTILITY BLOWERS



Designed for efficient, continuous, quiet duty in air conditioning systems in schools, labs, public buildings, industrial and commercial installations.

Simplicity of construction and sound engineering assure years of highly efficient, low noise level operation. 12½" to 36½" wheel diameters . . . 686 to 26,044 c.f.m.

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A COMPLETE LINE OF AIR MOVING EQUIPMENT

Charter Member of the Air Moving and Conditioning Association, Inc. (AMCA)

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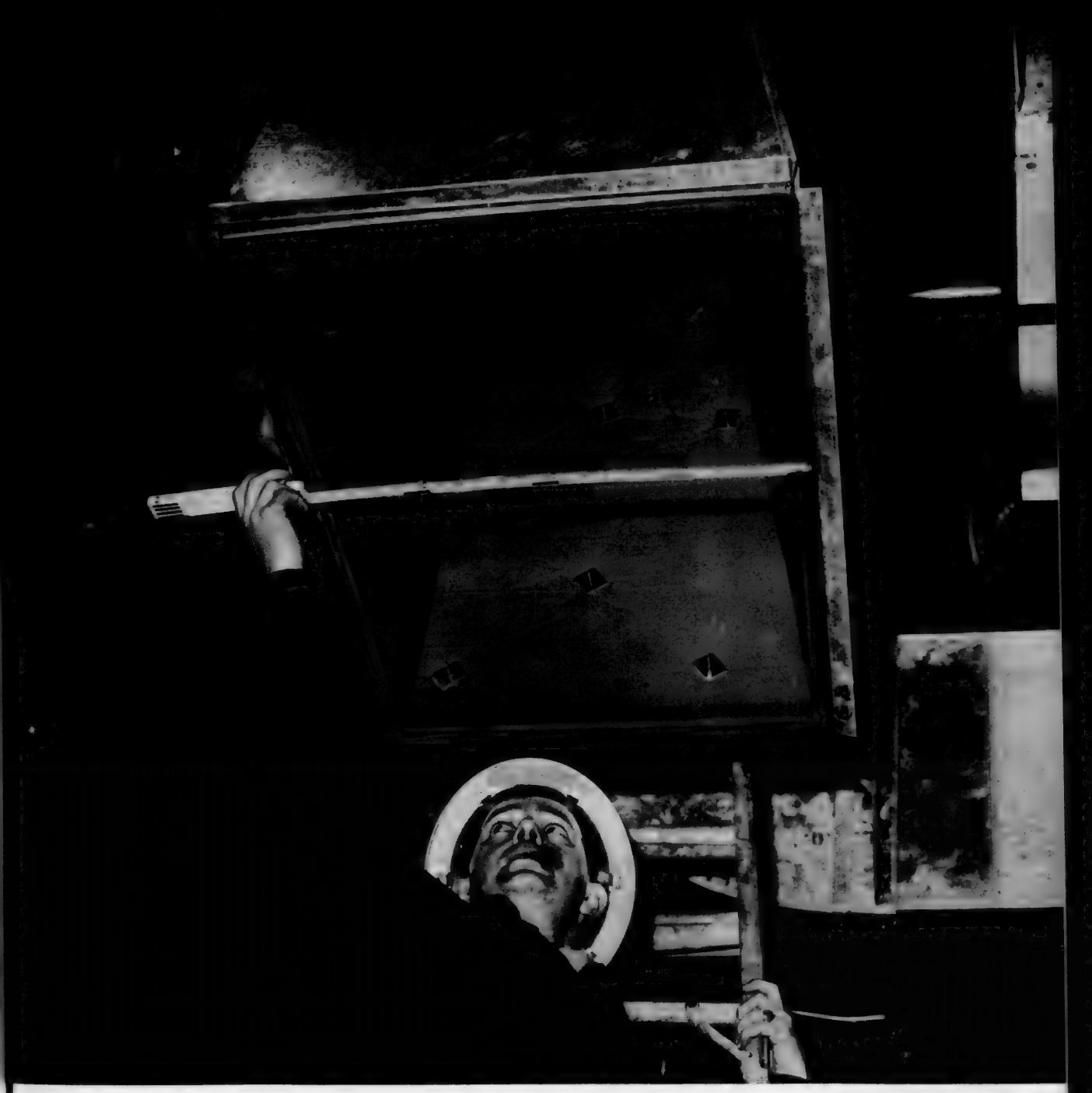

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.the only duct liner made exclusively of strong textile-type glass fibers...

"It will not pull apart under high vibration and high wind velocity conditions," says the Consulting Engineer who recently specified 15,000 ft. of Ultralite Duct Liner for one of America's outstanding new office buildings. "One of the major advantages of Ultralite liner over other forms is the long, fibrous structure which gives the material greater strength for retaining its structural shape."

Ultralite is the *only* glass fiber insulation made exclusively of long, strong, textile-type fibers. It's more rugged, more resilient—important advantages in duct systems continually subject to vibration and velocity. And easy-handling Ultralite offers exceptional acoustical and thermal efficiency, plus lower friction loss.

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GUSTIN-BACON *Mfg Co.* GUSTIN gb BACON

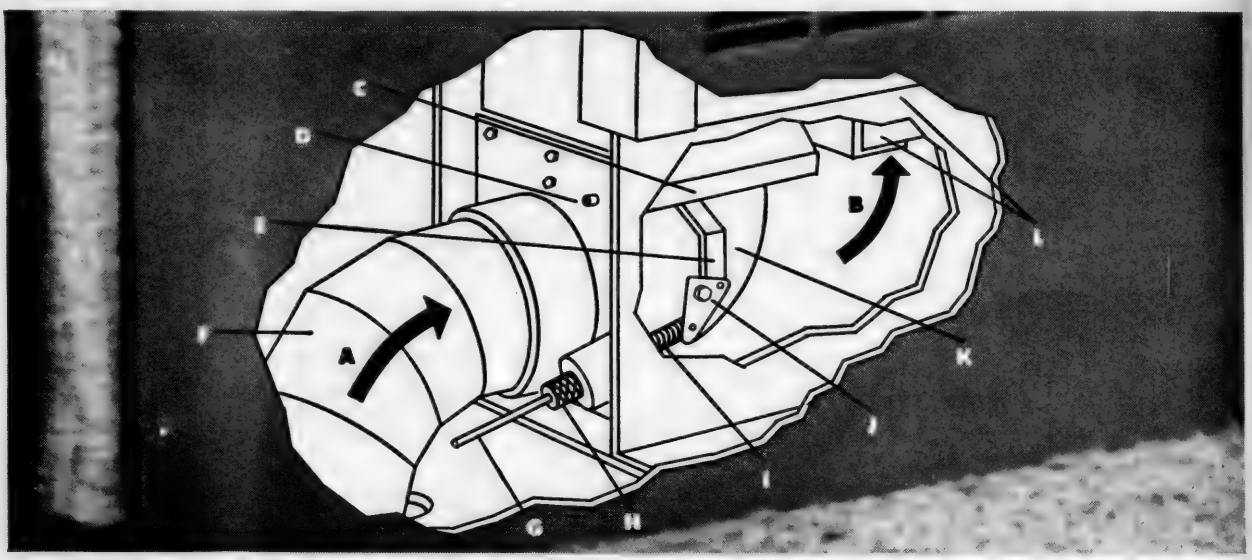
222 W. 10th St., Kansas City, Mo.

New Trane Air Flow Regulator provides permanent, automatic balancing for the first time

Major engineering advance cuts induction system balancing costs

Now, use a high pressure induction system for perimeter air conditioning of big buildings that will be balanced correctly from the start and will stay in balance automatically. TRANE engineering now brings you induction UniTrane units with the new Air Flow Regulator that acts automatically to assure proper air delivery and performance. Factory installed for either left hand or right hand air supply, the Air Flow Regulator obtains and maintains uniform air delivery. And when cooling requirements change due to tenant changes, one simple manual operation adjusts the unit—without affecting any other units in the system.

Talk to your nearby TRANE Sales Office about the advantages of the induction UniTrane system with the new Air Flow Regulator. Or write TRANE, La Crosse, Wisconsin.



(A) duct pressure **(B)** plenum pressure **(C)** diaphragm **(D)** vent **(E)** diaphragm linkage **(F)** air supply duct **(G)** adjusting rod **(H)** locking knob **(I)** spring **(J)** lever **(K)** damper **(L)** baffles

HOW THE NEW TRANE AIR FLOW REGULATOR WORKS: Operating on the principle of opposed pressures, the new TRANE Air Flow Regulator is easy to balance, stays in balance automatically.

Any change in pressure in the supply duct—whether a temporary fluctuation or a change caused by alterations elsewhere in the system—is offset automatically. Plenum pressure is kept constant at all times. Since the plenum pressure controls the air flow through the nozzles, the output of the unit remains constant—even though the pressure of the primary air in the supply duct may vary widely. A diaphragm, installed within the plenum, is linked to an aerodynamically balanced butterfly damper in the supply duct. Movement of this butterfly damper adjusts the plenum pressure.

The diaphragm is influenced by the plenum pressure on one side, opposed by an adjustable spring on the other side. The plenum pressure against the diaphragm, in opposition to the force of the spring, determines the damper position.

A rugged, precision device, the regulator assures a degree of system balance unattainable with the "trial and error" method of manual balancing. Only in a well-balanced system is the full measure of air conditioned comfort—the true value of the investment—obtainable.

For any air condition, turn to

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MANUFACTURING ENGINEERS OF AIR CONDITIONING, HEATING, VENTILATING AND HEAT TRANSFER EQUIPMENT

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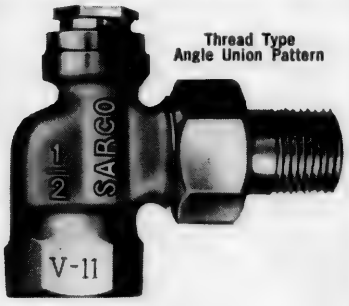
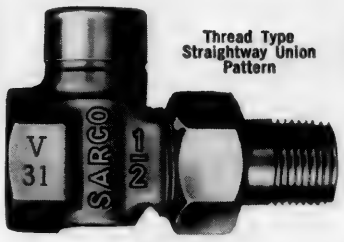
You don't have to treat 'em tenderly

. . . these burly Sarco Balancing Fittings are extra-strong!

FOR USE UP TO 125 PSI
Every single one
TESTED AT 150 PSI!
Can be furnished with
INTEGRAL MANUAL AIR VENTS
All patterns also available in sweat-type.

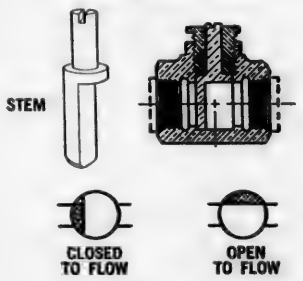


Thread Type
Angle Union Pattern



Thread Type
Straightway Union
Pattern

Straightway Screwed Pattern



Solid segment stem which
insures linear straight flow

Check other Sarco features that save installation headaches . . . assure top-heating performance . . . save you money

Yes, these Sarco fittings are really husky . . . made of heavy brass, of highest commercial quality. They won't crack when you put a wrench on them . . . as lighter fittings often do. Won't cause delays . . . waste high-cost time. Will save you money in the end.

More accurate heat distribution is assured by the solid segment stem of Sarco Balancing Fittings (see cross-section diagram, right). Insures linear straight line flow, not obtainable with the usual butterfly stems.

Integral manual air vents can be furnished with Sarco Balancing Fittings. Their use avoids the headaches and costly time waste when a system has to be drained to release air.

Sarco Balancing Fittings are made in thread and sweat types; all patterns. Also available . . . complete quality lines of access boxes for balancing fittings; valves; air eliminators. Ask for bulletins.

For undivided responsibility on your installations, specify and order from one "Complete Line" source . . . SARCO-SARCOTHERM. Sarcotherm Controls, Inc., 635 Madison Avenue, New York 22, N.Y.

Sarcotherm

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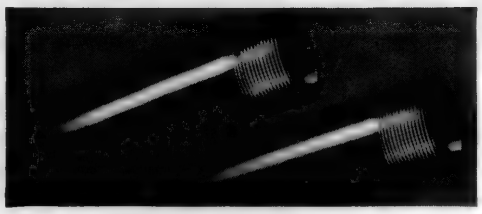
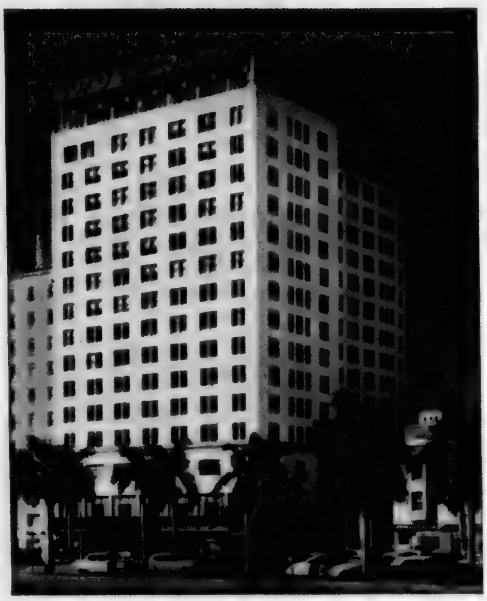




These air-conditioned Florida hotels use hundreds of feet of

Beth-Co-Weld Pipe

Each of these two hotels — the Casablanca at Miami Beach and the Columbus, at Miami — has hundreds of feet of Beth-Co-Weld steel pipe in its modern air-conditioning system. Both installations were made by Hill-York Sales Corporation, Miami. The pipe was supplied by A & B Pipe & Supply Company, also of Miami.

Beth-Co-Weld pipe is a popular choice for air-conditioning systems, as well as for general-purpose and sprinkler piping, because it is made from a good grade of steel by the continuous-weld process.

Beth-Co-Weld can be obtained in standard and extra-strong weights in sizes from ½ in. to 4 in. It comes in 21-ft lengths, plus or minus 1 in., and is also supplied in random and cut lengths. Specify Beth-Co-Weld for your next piping job.

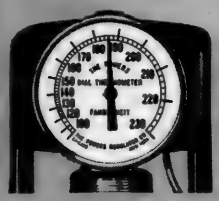
BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

BETHLEHEM STEEL

BETHLEHEM STEEL

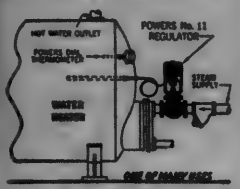
WHY POWERS No. 11 REGULATORS Give BETTER CONTROL and Last Longer



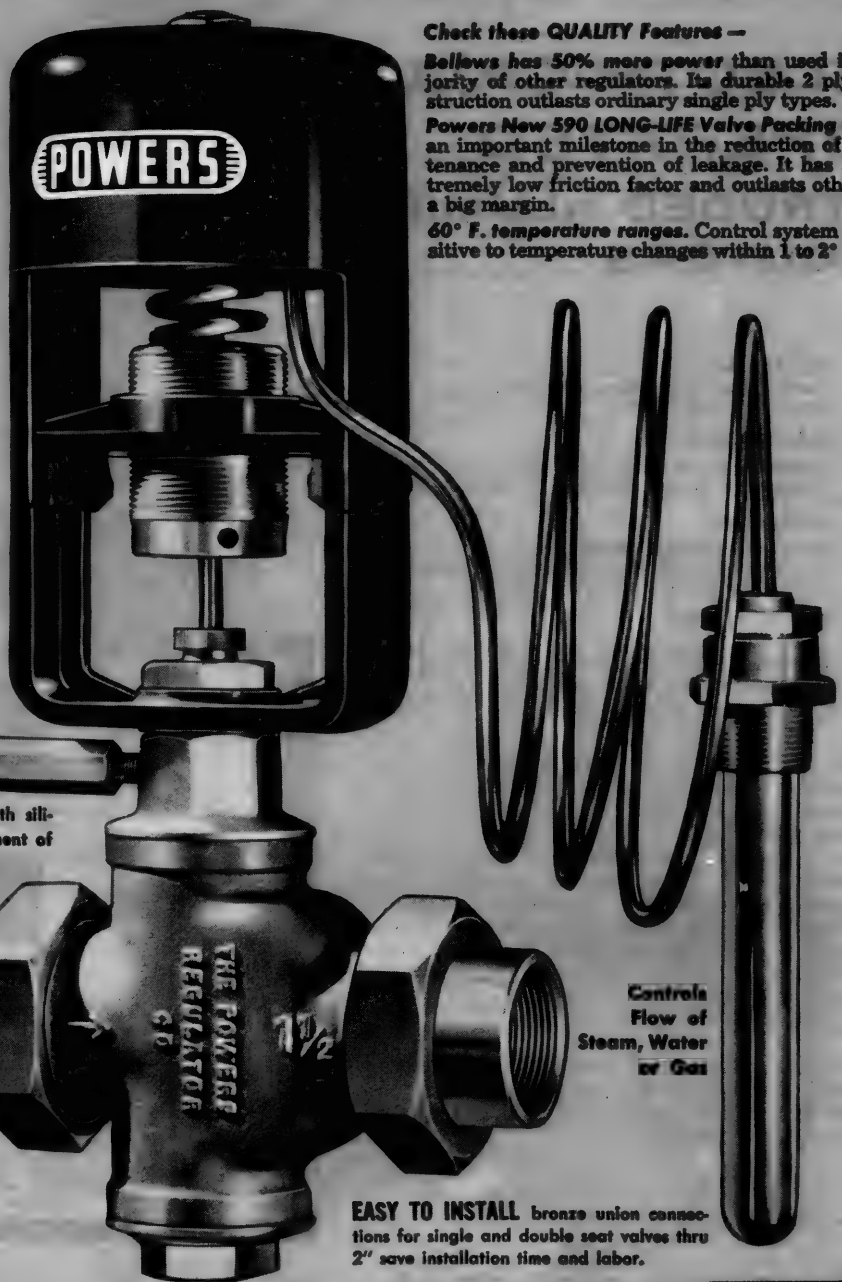
Temperature Indicating Regulator

A Versatile Control for hundreds of applications. Has big 4" easy to read dial thermometer. Gives visual proof of constant temperature control. Helps to accurately adjust the regulator. *A feature originated by Powers in 1930.*

Simplest, Reliable
TEMPERATURE CONTROL
made for: Many Industrial Processes, Heat Exchangers, Air Compressors, Diesel Engines, Fuel and Crude Oil Heaters and Treaters.



SELF OPERATING



Check these QUALITY Features —

Bellows has 50% more power than used in majority of other regulators. Its durable 2 ply construction outlasts ordinary single ply types.

Powers New 590 LONG-LIFE Valve Packing marks an important milestone in the reduction of maintenance and prevention of leakage. It has an extremely low friction factor and outlasts others by a big margin.

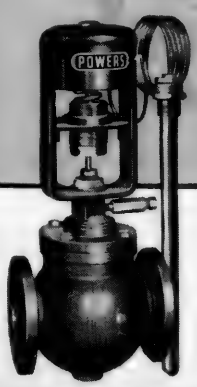
60° F. temperature ranges. Control system is sensitive to temperature changes within 1 to 2° F.

Valve Stem Lubricator with silicone grease aids easy movement of highly polished stainless steel valve stem.

Balanced (Double Seat) Valve

Controls Flow of Steam, Water or Gas

EASY TO INSTALL bronze union connections for single and double seat valves thru 2" save installation time and labor.



Above: Flanged Iron Body Valve with Double Seat for sizes above 2"

Use Powers 65 years of experience and engineering know-how to help you select the right type temperature regulator and right size valve. From our complete line of self operating regulators and air operated temperature controllers you can be sure of getting the control best suited for your requirements.

POWERS CONTROL — Since 1891

Call our nearest office or write us direct at 3400 Oakton Street, Skokie, Illinois.

(c14r)

Powers offers NATIONWIDE SERVICE in over 85 cities in the U.S. and Canada

THE POWERS REGULATOR COMPANY

Specify C/S

ELECTRICALLY OPERATED
EXTRUDED ALUMINUM LOUVERS

efficient
instant operation of banks of louvers up to 200 square feet.

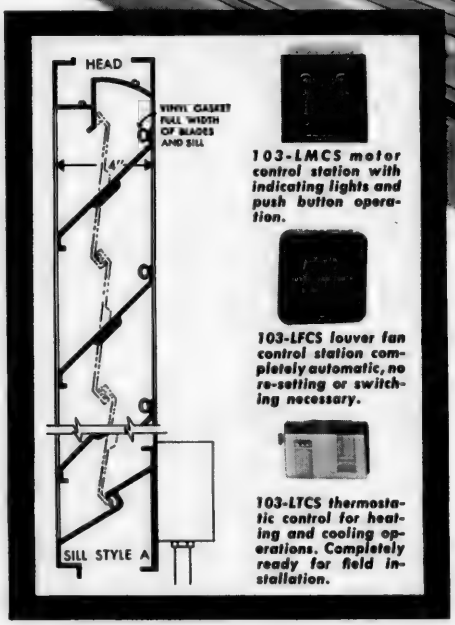
attractive
motor can be placed on either right or left jamb. Screens can be on either front or rear of louver.

reliable
each unit is pre-tested at the factory. No field adjustments or alignment necessary. Each unit is guaranteed for 2 years.

economical
costs are competitive with manual gear operated units controlling banks of louvers and actually cost less than other electric motor control systems.

Now the EX-110 electrically operated louver is available to you. All electric, the EX-110 motor operator operates up to 50 square feet of louver easily with one motor from any desired location. Three types of remote motor controls are available: manual push button control stations; thermostatic station controls and fan control station. All EX-110 components are simple to operate and simple to install. Each EX-110 louver arrives at the job site completely factory tested and assembled; no field adjustments or alignment is necessary.

The EX-110 electrically operated louver is a precision system-engineered product of Construction Specialties, Inc. It is a product you can specify with confidence.


HEAD
VINYL GASKET FULL WIDTH OF BLADES AND SILL
4"
SILL STYLE A
103-LMCS motor control station with indicating lights and push button operation.
103-LFCS louver fan control station completely automatic, no re-setting or switching necessary.
103-LTCS thermostatic control for heating and cooling operations. Completely ready for field installation.

C/S **CONSTRUCTION SPECIALTIES, INC.** Dept. 60
55 Winans Avenue Cranford, New Jersey

Please send me complete information on the EX-110.

☐ specifications ☐ prices ☐ technical data
☐ finishes ☐ accessories.

Name_____ Position_____
Firm_____ Address_____

Write today

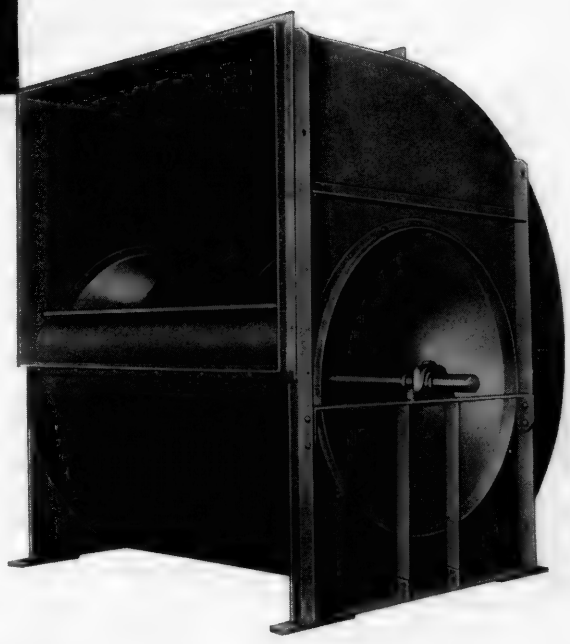
For complete information on technical data, budget prices, and architectural details and specifications. Full size operating samples are available for your critical analysis. If you would like to see an EX-110 sample just let us know.

see our catalog in Sweet's

from California to Massachusetts...

it's a typical installation!

Massachusetts Power Fixed Fans selected for 575 Lexington Avenue (See ad in New York Times, Feb. 23rd issue).
Size 100 fan shown below is DIDW, wheel dia. 59-½", 65,875 CFM.
This is one of seven return fans handling a total of 387,225 CFM.
Also included in installation are eight Massachusetts general exhaust fans.



575 Lexington Avenue.

Sam Minskoff & Sons—
Owners and builders.

Cushman & Wakefield Inc.,
Renting and managing agent.

Sylvan Bien & Robert L. Bien,
Architects.

Sears & Kopf—
John Anselmo Assoc.
Consulting Engineers.

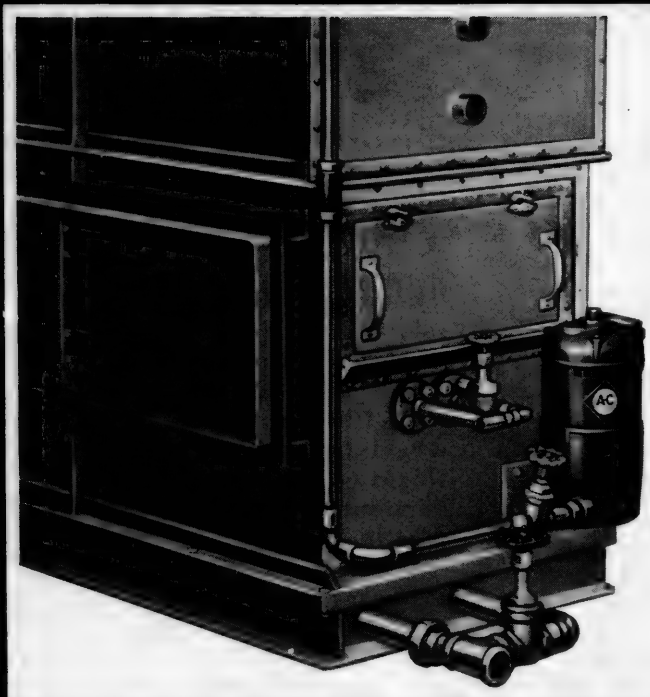
Raisler Corporation
H. V. & A. C. Contractor.

MASSACHUSETTS BLOWER DIVISION

The BISHOP & BABCOCK Mfg. Co.

4901 HAMILTON AVENUE CLEVELAND 14, OHIO

The MASSACHUSETTS Line

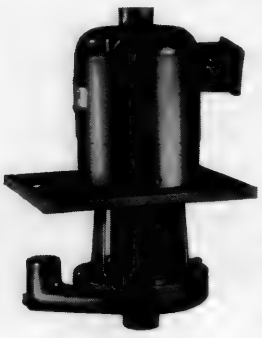


Vertical air washer
uses A-C flange-mounted pump directly mounted on washer reservoir.

A choice of pumps

for air-conditioning equipment—sealless or with mechanical seal . . .

Only 5-inch submergence
is needed by submerged-mounted models. They are sealless for season-after-season reliability.



Four optional positions
for the motor are possible with this sidewall-mounted model. It is also sealless to minimize maintenance.

HERE'S a line of air-conditioning pumps from Allis-Chalmers engineered with one idea: *to make equipment designers' jobs easier*. Here's how A-C did just that:

- **Choice of mounting** — Complete line permits *six* different mounting methods . . . for design flexibility of all types of systems.
- **Less tank room required** — Submerged models need only *5-inch* submergence. You save on tank size.
- **Choice of impeller** — Single-suction impellers are available in either enclosed or open design.

IN ADDITION to submerged and sidewall-mounted units, Allis-Chalmers also offers close-coupled and horizontal pumps to meet 99% of all air-conditioning applications.

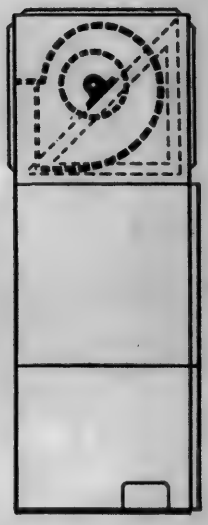
A-C PUMP EXPERTS can help with your application. Contact your Allis-Chalmers representative or distributor, or write Allis-Chalmers, General Products Division, Milwaukee 1, Wisconsin.

ALLIS-CHALMERS

A-5700

Here's an Economical and Efficient Improvement

for Air Conditioning Equipment . . .



FEATURES

Two-piece, pressed steel housing . . . occupies less space than similar pillow block housings.

Precision ball bearing, Fafnir Extended Inner Ring Type, offers extra wide bearing surface on shaft. Balls and races are finished for super-quiet performance.

Self-locking bearing collar of counterbored, mated-cam construction. Needs no lock washers, adapters, or other positioning devices.

Plya-Seals provide positive retention of lubricant and complete protection against contaminants. Special lubricant pre-packed at factory contributes to quietness of operation.

Thick, electric-current-conducting rubber interliner eliminates the need for metallic grounding springs or clips.

Six-page bulletin on all Fafnir Air Conditioning Units provides detailed information including dimensions and load ratings.

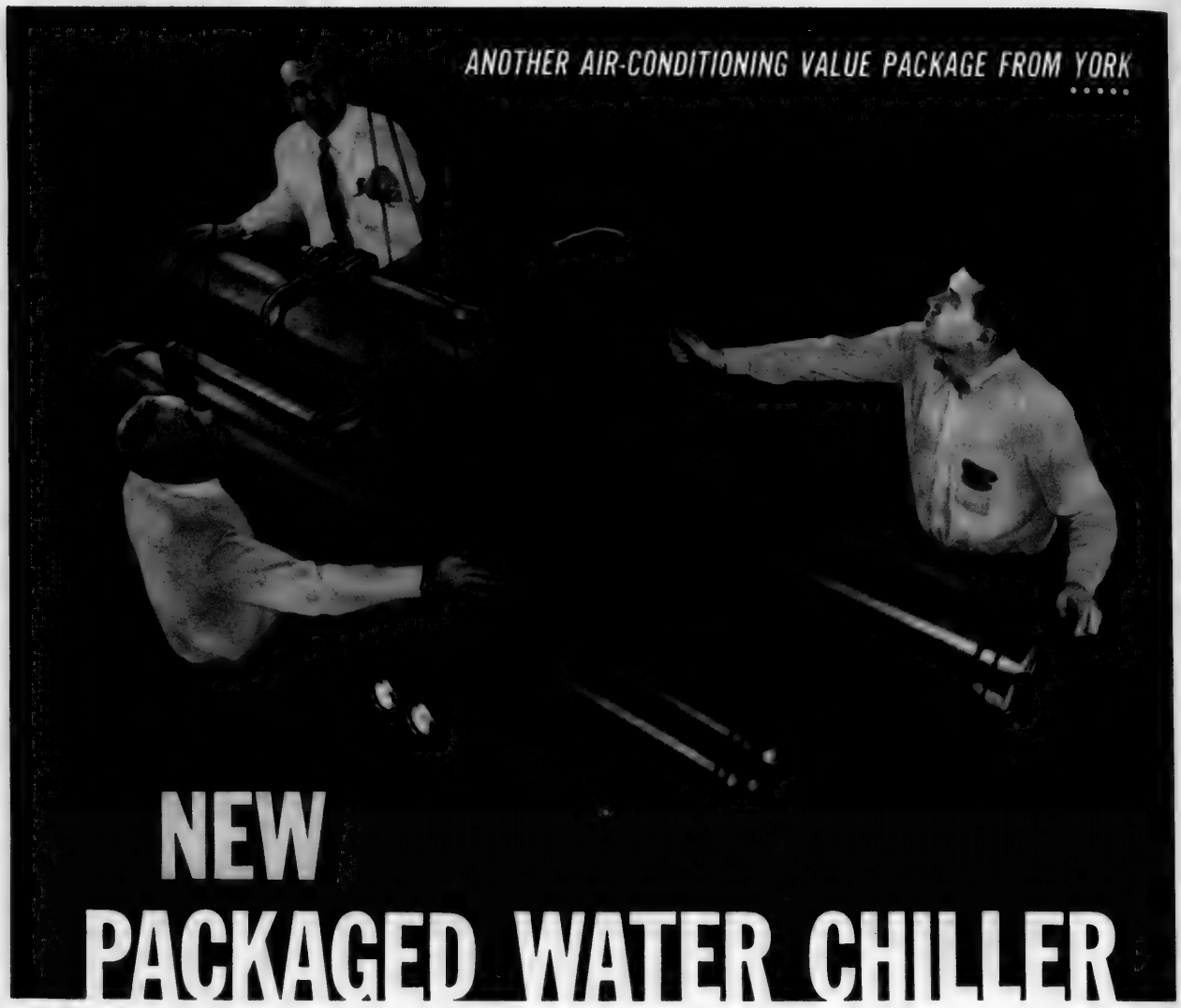
Specifically designed for air conditioning units with fan shafts up to an inch in diameter, the Fafnir RPB Type Ball Bearing Pillow Block offers an inexpensive way to improve performance, increase sales appeal. It has been adopted as standard equipment by several manufacturers. Actual installations are demonstrating its advantages.

Next to super-quiet, trouble-free performance, manufacturers are most impressed with the easy installation of RPB units. The bearing slip-fits onto shaft and is positively locked to it by a quarter turn of the famous Fafnir self-locking collar. The housing is installed with two bolts. It affords unrestricted initial alignment in all directions. For more information on the RPB unit and other Fafnir super-quiet ball bearing units designed specifically for air conditioning and heating equipment, write The Fafnir Bearing Company, New Britain, Connecticut.

FAFNIR

BALL BEARINGS

MOST COMPLETE LINE IN AMERICA



- **York offers the broadest range of capacities in the industry — 18 to 246 tons!**
- **Completely integrated components cut installation costs! Exclusive Flooded Cooler design cuts operating costs!**
- **Exclusive capillary oil return insures trouble-free operation at all load conditions!**

York makes news again — with a series of packaged water chillers designed to cut the costs and simplify the process of air-conditioning. These advanced units lead the field in immediate and long-term benefits both for you and for your clients:

FAST, EFFORTLESS INSTALLATION! The complete system is shipped to you on a single skid. Needs no special foundation. Most sizes can be moved through ordinary doorways. The unit comes complete with insulation, interconnecting piping, and automatic control center. To start up: just charge with refrigerant *by sight*, hook up to power and water supply — and your unit's in business.

LOW-COST, TROUBLE-FREE PERFORMANCE! These features are exclusive with York: *Flooded Coolers* and *positive refrigerant feed control* in all models assure top efficiency and maximum heat transfer over the entire range of load conditions. Positive, *direct oil return* from chiller to compressor completely eliminates the danger of interrupted flow under light loads. Automatic capacity controls save power by continuously adjusting compressor output to prevailing load conditions — without supervision.

SAVINGS IN MAINTENANCE! All components and wearing parts are readily accessible for inspection and maintenance. Tube cleaning of *both* cooler and condenser waterside is greatly simplified because all surfaces are easily reached from either end. And, of course, York's famous Certified Maintenance Service is available anywhere.

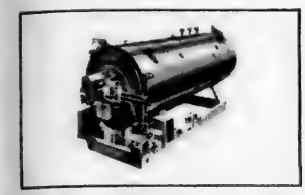
Figure for yourself the savings in dollars and manhours engineered right into this unit. It's another example of York's tradition of designing with the *real cost* of air-conditioning in mind. Consult your classified directory for the name and address of your local York sales representative . . . or write for Bulletin I-213 — which includes simplified specification tables. York Corporation, York, Pennsylvania.

YORK
CORPORATION
SUBSIDIARY OF BORG-WARNER CORPORATION

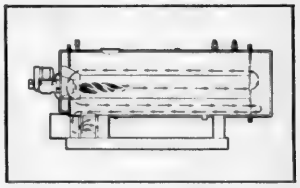
Millions Live Better with York

IN CANADA: CANADIAN ICE MACHINE COMPANY LTD., TORONTO

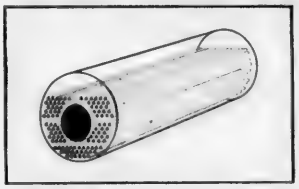
NOW . . . all these "BIG BOILER" features in a compact, economical package . . .



● **A complete package** including boiler burner, draft equipment, controls and all interconnecting piping and wiring. Completely assembled and factory fire-tested.

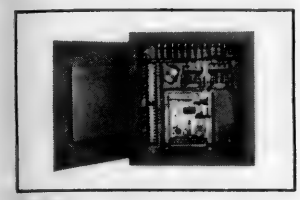


● **4-pass down-draft** design, promotes rapid water circulation. Decreasing tube volume in successive passes provides high combustion gas velocities and maximum heat transfer.

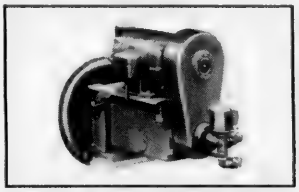


● **5 sq. ft.** of heating surface per b.h.p. Units reach conservative ratings with ease. Guaranteed thermal efficiency 80%. Stack temperatures not exceeding 125° above steam or water.

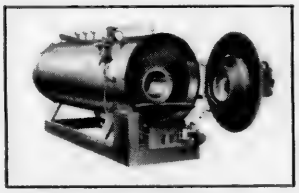
● **Induced draft** operating at relatively slow speed results in unusual quiet plus safety from danger of forcing gases out into boiler room. Negative furnace pressure also protects refractory.



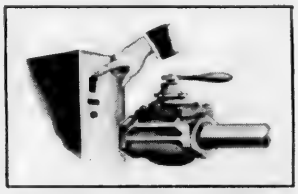
● **Fully automatic** operation firing oil, gas or both. Firing rate adjusts to demand, never overfiring wastefully, but handling sudden increases without lag. Variety of controls available.



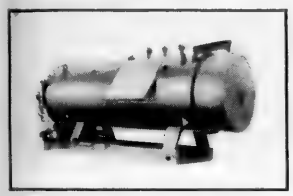
● **Superior Rotary Burners** on all sizes firing No. 4, 5 and 6 oil. Most dependable type of equipment ever devised for burning heavy oils. Burners require minimum supervision, and no lubrication.



● **Hinged** front and hinged or davited rear door on all units. Doors may be opened simply without removing refractory and are simply and effectively sealed with standard asbestos rope.



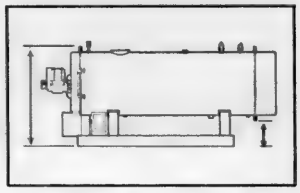
● **Instantaneous fuel change-over.** Units equipped for oil and gas firing may be changed from one fuel to another quickly and simply by operating only a switch and a valve.



● **Completely insulated** and jacketed. Even the bottom of the boiler shell is covered with 2" insulation. No uninsulated areas for heat loss and unnecessary heating of the boiler room.

● **Down-draft design** places furnace high in shell, safely away from danger zone . . . completely eliminates bagging and blistering resulting from mud build-up in bottom of boiler.

● **Constant gas pilot** remains lit at all times, prevents accumulation of gas in the furnace which could result from even an almost undetectable leak in the gas valve.



● **Low total height** but with clearance from floor allows ample room under the shell for inspection, maintenance and installation of piping. The COMPACT is practical as well as compact.

SUPERIOR "COMPACT"

Here at last is a boiler which combines all of the most desirable features of big boiler design with an unusual degree of compactness. Ideal for installations where space is limited, it also provides an economical answer both from the standpoint of purchase and installation costs for any application having steam requirements of from 20 to 200 B.H.P.

Pressures to 250 psi, or hot water units also available. Write today for Bulletin 1019C

SUPERIOR COMBUSTION INDUSTRIES INC.
TIMES TOWER, TIMES SQUARE, NEW YORK 36, N.Y.

Specialists in **PACKAGED BOILERS . . . exclusively**

The twin problems of high temperature and humidity, augmented by excessive heat from electronic equipment and klieg lights, are effectively overcome in the new WWL-TV building* in New Orleans by Thermal central plant type and multizone air conditioning units.

The entire conditioning system has been carefully designed to handle heavily loaded areas, such as studios and amplifier rooms, without overcooling other parts of the building. In summer, the typically muggy, sultry, New Orleans atmosphere is made mountain fresh, while in winter, the year around Thermal units warm the building just as effectively.

Thermal manufactures quality equipment for perfect service in every climate. The Thermal line includes central plant and multizone conditioners, sprayed coil units, heating and ventilating units, heating and cooling coils, and air-cooled condensers. Write for catalog.

*Architects: Diboll-Kessels & Associates
Consulting Engineers: Joseph E. Leininger & Associates
General Contractors: Perrilliot-Rickey Construction Company, Incorporated
Mechanical Contractors: Emile M. Babst Company

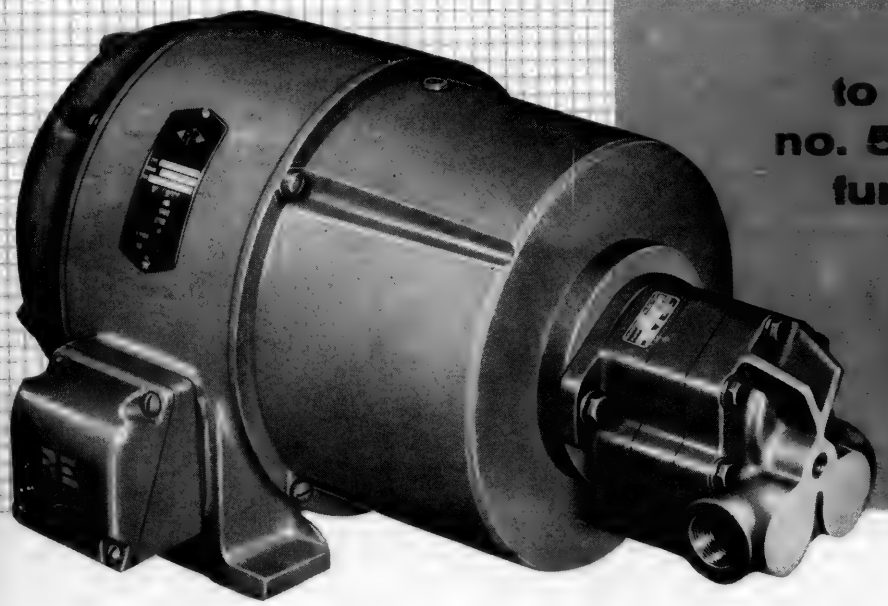
Agents in principal cities.

Quality Products Since 1945.

THERMAL ENGINEERING CORPORATION

2605 W. DALLAS • P. O. BOX 13254
HOUSTON 19, TEXAS

from Webster
NEW SUPPLY PUMP EQUIPMENT



to handle no. 5 and 6 furnace oils

Webster direct drive units are motor driven at 900 rpm optimum speed — relatively low speed lengthens pump life. Capacities and pressures of belt driven sets can be varied to meet specific requirements by changing size of pulleys.

Now the efficiency and high operating performance of Webster supply pumps are available for commercial and industrial applications requiring the handling of heavy oils. The new Webster heavy oil pumps are built in either direct drive or belt drive units with motors ranging from ¼ h.p. to 2 h.p. Plenty of capacity, too . . . from 28 to 575 gph, with pressures up to 300 psi. Extra large ports mean initially cold, heavy oils can be handled without restrictions.

New Webster pumps are compact, easy to install — require less plumbing. Write for additional information.

call the man from Webster

HEATING DIVISION
WEBSTER ELECTRIC
Rracine · Wis

Bulletin edn. A-120

Have THE MAN FROM WEBSTER contact us.

Please send the following:

Bulletin A1OA1 containing complete specifications and dimensional drawings.

New information or data as published.

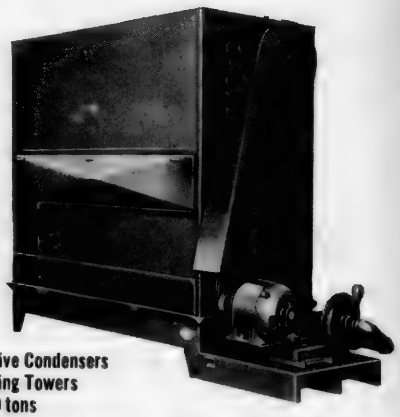
Name .....

Title .....

Company .....

City ..... **State** .....

You can count on HIGHER PROFITS WITH Curtis AIR CONDITIONERS



Evaporative Condensers
and Cooling Towers
up to 100 tons
Air handling units to match.

Packaged Liquid Chillers—
7½ to 100 tons—F-12 or F-22.
With room console units to provide
controlled cooling and heating
without duct work.

HERE'S WHY...

MAXIMUM DEPENDABILITY

Each CURTIS unit is backed by 104 years of engineering and manufacturing experience . . . one of many reasons why CURTIS air conditioning equipment operates at maximum efficiency with a minimum of maintenance.

CUSTOMER SATISFACTION

The long operational life and minimum service requirements of CURTIS air conditioning, combined with peak performance, assures satisfied customers.

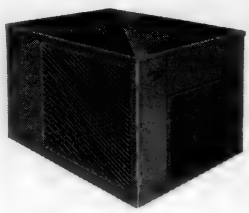
PRE-SOLD PROSPECTS

National advertising beamed at virtually every prospect category helps *pre-sell* Curtis equipment for you. CURTIS provides sales and promotional aids to make your selling job *easier*.

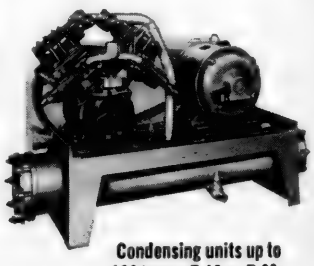
PRICED FOR PROFITS

All Curtis air conditioning equipment is *competitively* priced, with a very generous profit margin *for you!*

Packaged
air conditioning
units—
3 through
50 tons.



Packaged Air Cooled Air
Conditioning Units—2
through 7½ tons. Residential
and commercial applications.



Condensing units up to
100 tons—F-12 or F-22.

REMEMBER—
you can count on Curtis

OUR 104th YEAR

MANUFACTURING COMPANY • REFRIGERATION DIVISION

1999 Kienlen Ave., St. Louis 20, Mo.

C-35

DRYNESS

best reason in the world for using

genetron®

SUPER-DRY REFRIGERANTS

"Genetron" Refrigerants are the ultimate in dryness. In "Genetron" 12, for example, there is less than one-thousandth of one percent of moisture! And the tight specifications for "Genetrons" are consistently *bettered* in production. That's why smart service engineers everywhere are insisting on Super-Dry "Genetrons."

Service? No matter where you are there's a "Genetron" wholesaler as near as your telephone. Make *your* next order—*"Genetron."*

QUICK FACTS on GENETRON Super-Dry Refrigerants

- Guaranteed exceptionally low moisture content.
- Noncorrosive to standard equipment materials, nontoxic, nonflammable, stable, safe.
- Critical and freezing points well outside range of operating uses.
- Solvent action on oil helps prevent solidification or congealing of lubricant; aids in lubrication of equipment; generally miscible with oil.
- Freely interchangeable and may be mixed in any proportions with comparable fluorinated hydrocarbons meeting the same strict refrigerant specifications.
- Available everywhere, from refrigeration wholesalers throughout the country.

GENETRON 11 ORANGE LABEL CCl_3F
Trichloromonofluoromethane

GENETRON 12 WHITE LABEL CCl_2F_2
Dichlorodifluoromethane

GENETRON 22 GREEN LABEL $CHClF_2$
Monochlorodifluoromethane

GENETRON 113 PURPLE LABEL $C_2Cl_3F_3$
Trichlorotrifluoroethane

GENETRON 114a BLUE LABEL $C_2Cl_2F_4$
Dichlorotetrafluoroethane

Allied Chemical

GENERAL CHEMICAL DIVISION

40 Rector Street, New York 6, New York

Designer:
Maria Bergson Associates

STRIPLINE

Distinctive SLOT TYPE Diffusers

Look around . . . you'll see STRIPLINE by AGITAIR everywhere. And no wonder. STRIPLINE combines the best features of both slots and efficient air diffusers to provide equalized air flow throughout its entire length.

Slender, inconspicuous, practical and versatile . . . STRIPLINE slot diffusers can be located in walls, ceilings, coves, moulds, window reveals, stools... yes anywhere to suit interior design.

THERMOTANK — AGITAIR

high velocity units • punkah louvers
air diffusers • filters • exhausters

Sold exclusively by representatives for:

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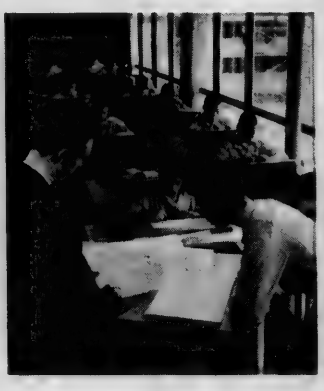
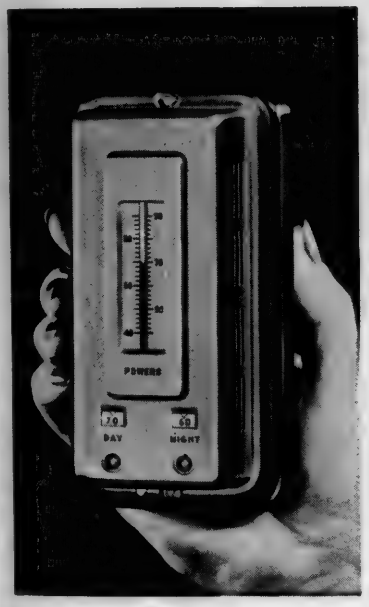
Write for Complete Stripline Catalog

Type H Stripline shown in above installation

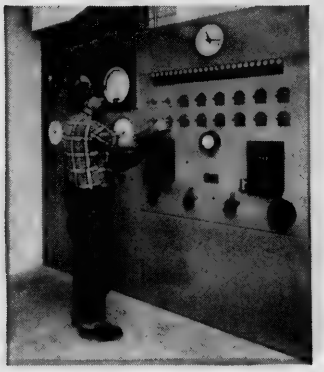
Teachers and Students.... Administrators

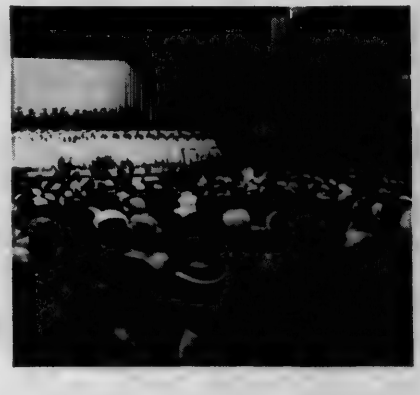


Engineers and Taxpayers



Powers DAY-NIGHT Thermostats are adjustable for normal temperature during occupancy and lower economical temperature during unoccupied periods.





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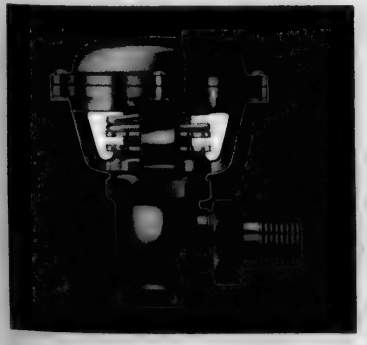

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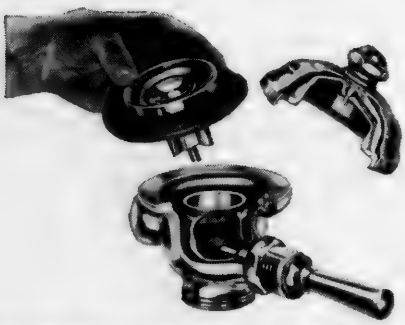

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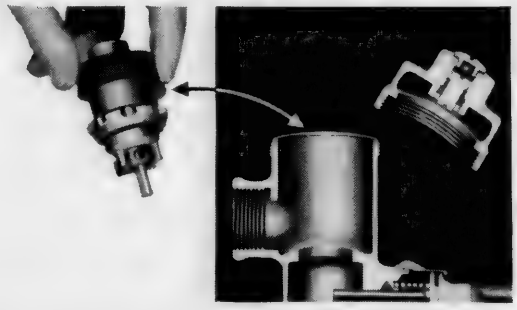

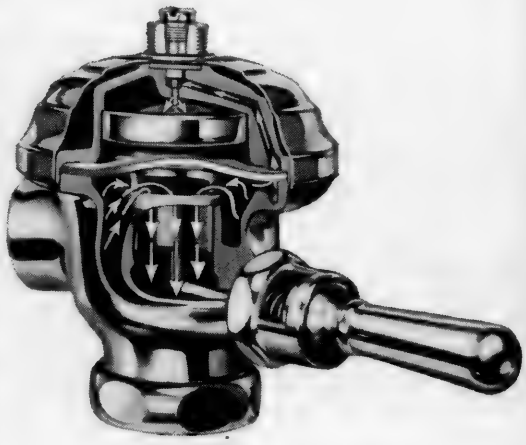

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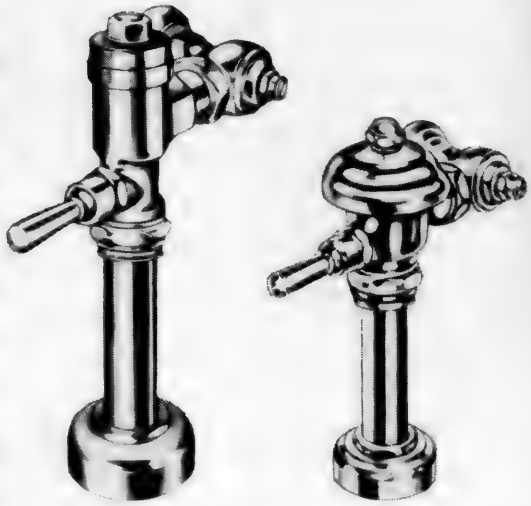

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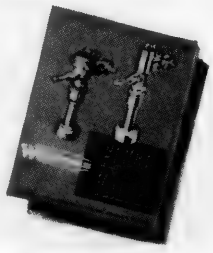

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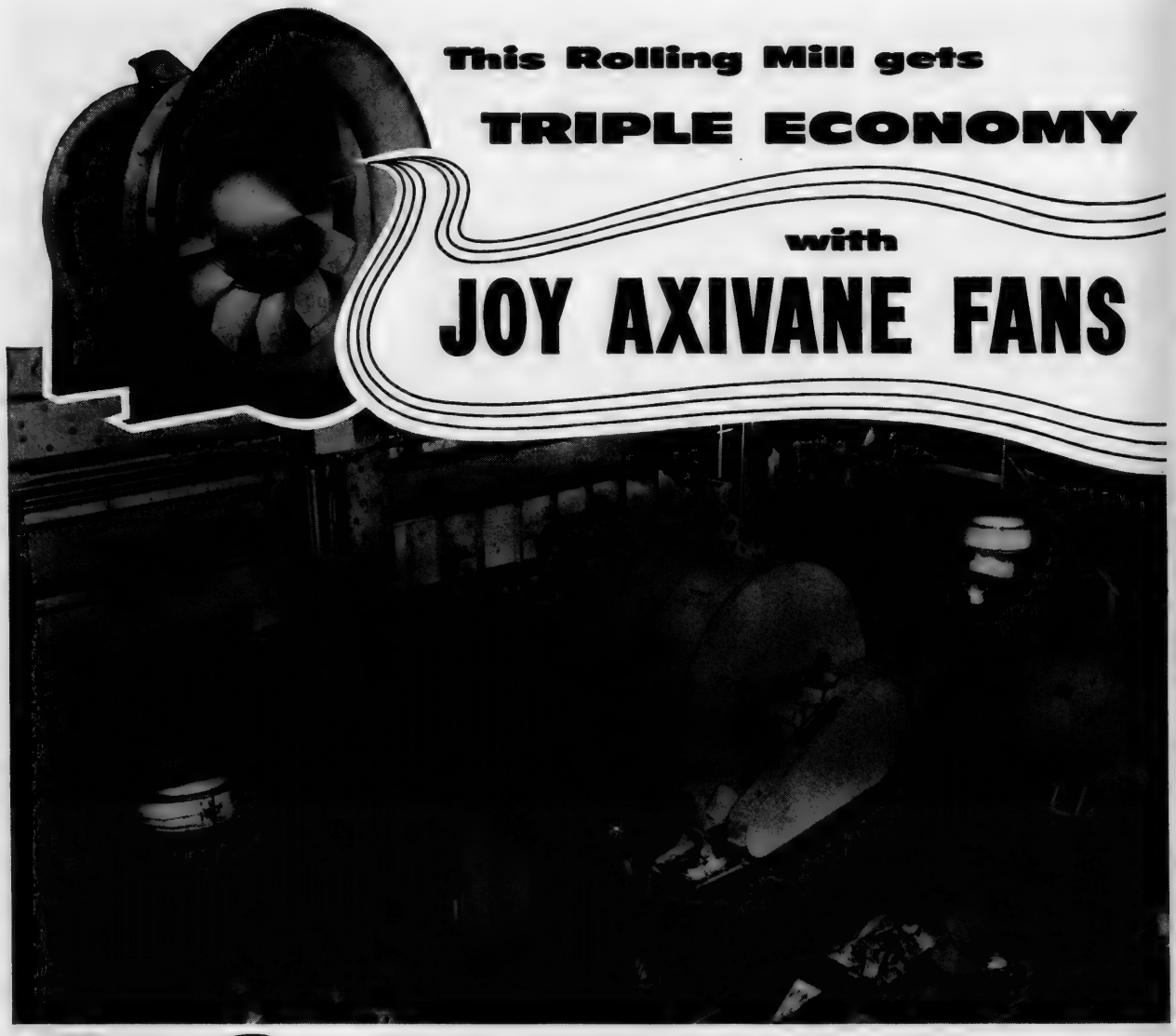

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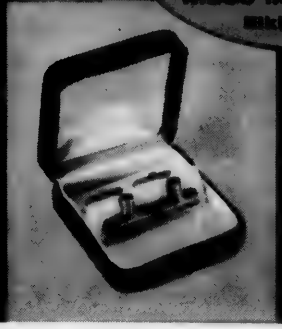

Fig. No. 9611-R (4⅛" x 4⅛" x 3⅛"—actual size)

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Automatic Control of Primary Air Units

for induction air-conditioning systems

N. J. JANISSE and R. G. WEEKS
Johnson Service Company, Milwaukee, Wis.

The primary purpose of this article is to discuss the application of automatic controls to an induction air conditioning system. The system is described and the functions of its components are outlined, after which methods of control are discussed. Finally, a typical complete system is presented and its functioning detailed. While examples presented are those involving the application of pneumatic controls, the principles apply equally to other types of air-conditioning controls.

AN INDUCTION air conditioning system may be described as one in which a supply of conditioned primary air is distributed from a central source through high velocity ducts to room induction units where it induces a flow of recirculated room air through the unit coil, discharging the mixture into the space to be conditioned. The induction system consists of three major components:

1. The primary air system.
2. The individual room induction units containing a heating-cooling coil.
3. A water circuit including water heater, water chiller, pumps, etc.

Induction systems are designed to provide year around air conditioning to the perimeter zones of multi-room, multi-story buildings, with individual temperature control in all spaces of these zones. Because perimeter exposures present difficult problems relating to solar and transmission factors, these conditions must be given special consideration.

The transmission factor may be either positive or negative. The solar factor may change from maximum to zero in a few minutes. Either factor may be greatest at different times of the day in different parts of the building. To provide uniform comfort conditions in all areas simultaneously, it may be necessary to divide a building into zones so that each zone may be handled individually.

With a properly designed system, heating and cooling are available for any and all units whenever required, so that accurate, individual control of room temperature is possible throughout the entire year.

During the heating season, for instance, warm water is supplied to the secondary or induction unit coils. Some areas of the building may require cooling at this time due to internal or solar gain. The required cooling to ofiset this gain is provided by cool primary air supplied to the units.

When the room thermostat calls for cooling, the secondary coil valve closes and the cool primary air, mixed with induced recirculated air, discharges into the conditioned space. When more cooling is required than can be supplied by the primary air, the system is changed to cooling operation and chilled water rather than warm water is supplied to the secondary unit coils. At this time the primary air is usually heated to above room temperature to accommodate those rooms still requiring heat.

THE PRIMARY AIR UNIT

Functions—The primary air unit performs several tasks:

1. Outdoor air, and occasionally return air, is drawn into the primary air unit and is distributed throughout the system for ventilation. This constitutes approximately 20 to 25 per cent of the total air circulated in the conditioned space.
2. The unit is designed to handle the entire latent load of the area served by the system.
3. The system distributes the air at high velocity to the room units. This air provides the motive force for room air induced through the room unit and circulation of the mixture throughout the room.

Primary air is heated by preheat (if necessary) and reheat coils. Cooling and dehumidification, or humidification, is done by cooling coils, sprays, or a combination of both.

All primary air is filtered in the central unit. Figure 1

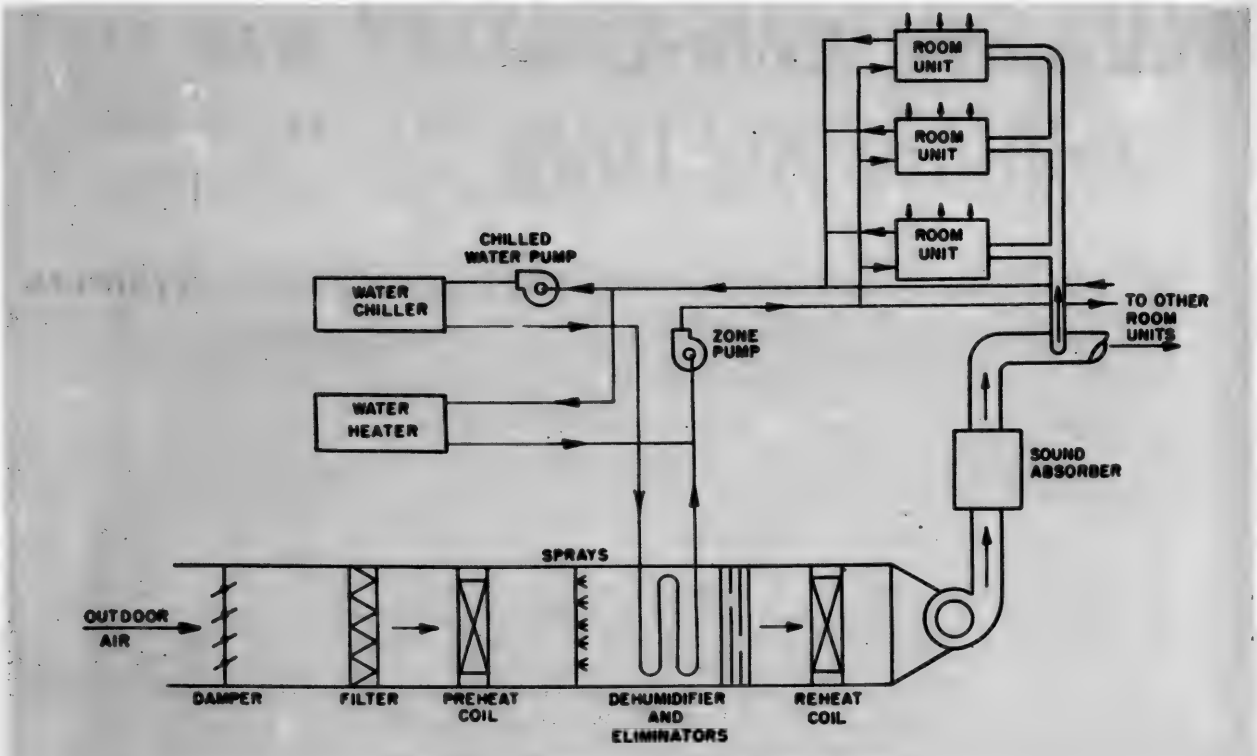


Fig. 1. Typical arrangement of single zone system.

shows one arrangement of the various components required to perform the above functions.

This type of system is particularly adaptable to office buildings, hotels, and other structures with a similar type of occupancy since the ventilation requirements are relatively small and the latent load is a relatively small percentage of the total cooling load.

Water Circuits—In general, the water performs two functions, both of which are indispensable to proper operation of the system:

1. The water must be chilled to provide dehumidification and cooling for the primary air system during the cooling cycle.

2. It must be heated or cooled to provide hot or chilled water for the room induction unit coils.

Chilled water may be supplied to the system by conventional mechanical chilling equipment.

Figure 1 shows, also, a typical water flow diagram for an induction system. Note that the chilled water flows through the dehumidifier before entering the secondary coils. This provides the dehumidifier with the coldest water, giving it sufficient capacity to maintain the required dew point temperature.

In Fig. 1, hot water is supplied only to the secondary units. The preheat and reheat coils could also be supplied with hot water but usually are steam coils. The hot-water is supplied through the same piping as the chilled water. Proper valving of the water circuit prevents hot water from entering the chiller during the heating cycle.

Components—The primary air unit is composed of several sections as follows:

1. *Damper Section*—One hundred per cent outdoor air is usually used in the primary air unit. However, there are occasions when some recirculated air may be used either continuously or at certain times. For 100 per cent outdoor air systems, the controls are so arranged that the fan cannot start until the outdoor air damper is open, thus avoiding unnecessary pressure strain on the ductwork. If there is a recirculated air connection to the unit, this precaution is not necessary.

2. *Preheat Coil Section*—During heating operation, the preheat coil performs the dual function of preventing freezing air from entering the dehumidifier and provides heat to regulate humidification if used.

3. *Dehumidifier Section*—Generally, the dehumidifier section consists of one bank of sprays and a cooling coil. The sprays operate continuously during cooling operation, insuring a wetted coil for better heat transfer. The cooling coil is usually of the chilled water type, but a direct expansion coil is sometimes used.

The sprays provide humidification during the heating operation. In extremely cold weather, however, the sprays may be shut off to prevent frosting of windows.

The moisture content of air leaving the dehumidifier section can be controlled by maintaining the desired dew point temperature in this section.

4. *Reheat Coil Section*—When required, the reheat coil raises the primary air temperature to a value above the temperature of the air leaving the dehumidifier. The reheat coil is not used at all times, as explained under the subsequent discussions of control arrangements. A separate reheat coil is usually used for each zone as shown in Fig. 4. If there is only one zone, the coil may be placed ahead of the fan as shown in Fig. 1.

CHARACTERISTICS OF THE SYSTEM

Primary air, at proper temperature and moisture content, is discharged through a sound absorber into high velocity ducts for distribution to room units throughout the zone or zones.

This air is introduced at high velocity into the room units through nozzles or jets so located that their discharge induces room air through the coil. The primary air and recirculated air mix before entering the conditioned space. Depending on the season, the room air induced through the room unit will be either heated or cooled by the secondary water coil which handles only the sensible load of the room.

Both the secondary water temperature and the primary air discharge temperature are of paramount importance for proper operation of the system. Although these temperatures may differ with the nature and requirements of particular installations, the schedule shown in Fig. 2, which assumes an outdoor winter design temperature of 0 deg F, is typical.

Figure 2 shows that during the heating season the secondary water supplied to the room unit coils is at a relatively high temperature—150 deg—when the outdoor air is at, or below, design temperature.

The hot water must supply sufficient heat to the room unit coils to handle room losses as well as the load added by the cool primary air. The primary air temperature remains constant at 40 deg until the outdoor air temperature reaches 40 deg. At this time, primary air temperature increases with the outdoor temperature.

During this period, cool primary air is available at all of the secondary units. Heating is supplied by the secondary water. Switchover to the cooling cycle should take place when the cool primary air can no longer satisfy cooling requirements in areas having cooling demands. This may occur at any temperature between approximately 45 and 65 deg outdoors, depending on internal heat gains, solar gains, etc., and is represented by the cross-hatched area.

In Fig. 2 the changeover to cooling operation is shown as occurring at 55 deg outdoors. The secondary water temperature is dropped to 55 deg and remains at this value during cooling operation. The primary air temperature is increased to 80 deg. Thus, heating and cooling are again available. As the outdoor temperature continues to rise the primary air temperature is reduced until, at 80 deg outdoors, it reaches the temperature established by the dehumidifier, say 55 deg. Since heating is no longer required in any spaces, reheat is no longer used.

Careful system design, proper zoning, and sufficient regard for the primary air and water temperature relationships will be rewarded by a system with the utmost flexibility. The changeover band, represented by the cross-hatched area of Fig. 2, should be sufficiently wide that the exact changeover point is not critical. This is important when both heating and cooling are available at any unit, regardless of whether the system is operating on the heating cycle or the cooling cycle. It permits some changeover latitude on the part of the operating engineer and is very desirable since changing from the heating cycle to the cooling cycle necessarily involves starting the refrigeration equipment. It also reduces the need for automatic changeover.

Another arrangement sometimes used for control of the primary air temperature involves heating the primary air to about 80 deg at winter design temperature and then gradually reducing it as the outdoor temperature in-

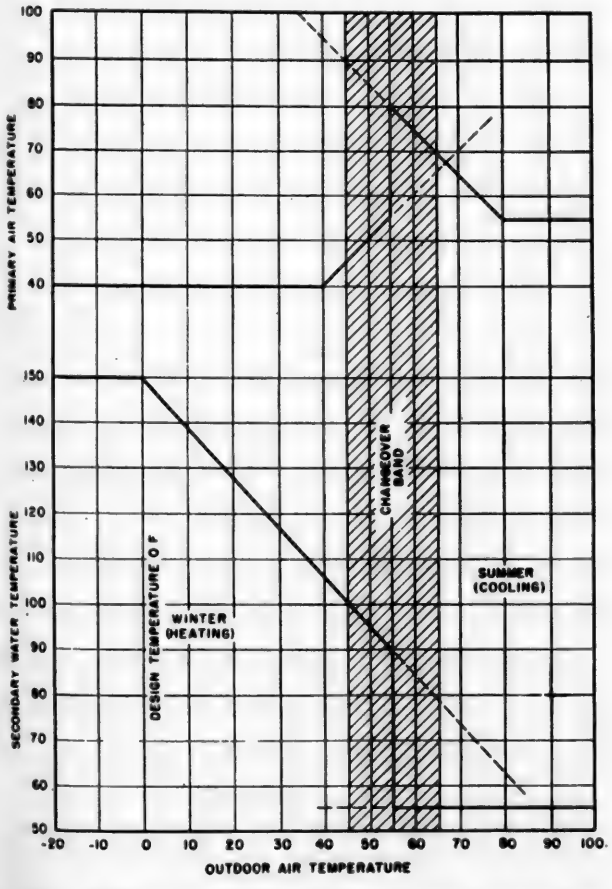


Fig. 2. Relationship of primary air and water temperature.

Norman J. Janisse is assistant chief field engineer for Johnson Service Co., Milwaukee, Wis. Immediately after receiving his Bachelor of Science Degree in mechanical engineering in 1948, he joined the field engineering department to which he has been assigned since then. In addition to supervising field engineering personnel and training, he is engaged in application work, field testing, and liaison work with the allied industries. He is a past president of the Milwaukee Section, Instrument Society of America, and also has held several national offices in ISA. He is a member of the Wisconsin Chapter, American Society of Heating and Air-Conditioning Engineers.

Robert G. Weeks has been with Johnson Service Co. for six years. Now a field engineer, he attended the Milwaukee School of Engineering before joining the company as a technician at Cincinnati, Ohio. Later he moved to Texas where he was assigned to the Houston and San Antonio offices. He was transferred to Milwaukee as a field engineer in 1955. He currently handles a variety of field problems and is a lecturer in the company's training schools.

creases until it will serve as a cooling medium when required. The water temperature would be controlled as previously described. This arrangement provides the same degree of flexibility but utilizes both the primary air and water as heat sources when cooling is not needed.

These are but two of many possible control variations and are intended only as a guide in understanding how to schedule temperature relations for specific systems.

METHODS OF CONTROL

Like most air conditioning systems the several components of high pressure induction systems lend themselves to more than one method of control. The exact method selected will often be dictated by the results required of the specific system. A discussion of methods commonly applied to these systems follows:

Changeover—Several functions must be performed when the system is switched from heating to cooling:

1. Controls used only during cooling operation must be activated while those used during heating must be made inoperative.
2. Zone water must be diverted from the heater to the chiller circuit, but not until it has become cool enough to avoid damaging the chiller.
3. The cooling compressor controls must be so positioned that the compressor can operate under control of its chilled water thermostats.
4. Controls on the individual room induction units must be switched from direct to reverse action.

Substantially the reverse of this must be accomplished when switching from cooling to heating.

One method employs a pneumatic push-button switch. When the "Cooling" button is depressed it closes the steam valve on the water heater. Zone water is allowed to recirculate until it becomes cool enough to activate a thermostat set for about 80 deg F. This thermostat then operates a three-way valve to divert the water from the heater to the chiller circuit, and an air valve in the dual pressure air supply main to the individual unit thermostats, which reverses their action. It also closes an electric switch to start the condenser water pump and, through an electrical interlock and time delay, the chilled water pump. The refrigeration compressor can then start when there is demand from the chilled water thermostat.

An alternate method of changeover control is to provide a conventional, manual start-stop station for the condenser water pump. In this case, pneumatic switchover would be provided by a solenoid air valve so installed that it is energized when the condenser water pump starts.

The above arrangements provide for manual changeover which is most common. Automatic changeover may be provided by an outdoor thermostat with its bulb located in a solar compensator so as to respond to outdoor temperature plus solar radiation. The thermostat would replace the pushbutton switch.

Starting the Fan—Unless there is a recirculated air connection to the primary air unit, the fan should not start until the outdoor air dampers are open. To start the fan a pneumatic pushbutton switch opens the outdoor air damper. When the damper opens sufficiently, a lever arm control energizes the holding coil of the fan motor starter.

An alternate method may be provided by using a solenoid air valve, which, when energized by pushing the electrical motor start button, opens the outdoor air damper. The damper lever arm control then starts the fan as described above.

Preheat Control—The main function of the preheat coil is to protect the apparatus from freezing temperature. It also provides heat for proper humidification when required. Two methods of preheat control are:

1. A thermostat with its bulb located after the preheat coil, controls the valve in the preheat coil supply line.
2. An alternate may be provided by locating the thermostat bulb after the sprays in the dehumidifier section, to operate the preheat coil valve and maintain the desired winter apparatus dew point. A safety thermostat, its bulb located after the preheat coil and set for approximately 35 deg F, would provide freeze protection.

Dehumidifier Control—The dehumidifier section will not require special control in most cases. Since the dehumidifier is provided with the coldest water available in the system, the chilled water temperature controls on the mechanical cooling equipment are usually sufficient. Where more precise control of the summer apparatus dew point is required, additional controls on the dehumidifier may be employed.

1. One method is to provide a thermostat in the dehumidifier outlet to control a three-way mixing valve in the supply to the dehumidifier.
2. An optional feature used only during the heating cycle provides a high limit on winter humidification by employing a room humidostat and a pressure-electric switch wired across the spray pump starter. It can be used to prevent condensation on windows by locating the humidostat on an outside wall, preferably near a window.

Reheat Control—Two methods may be used:

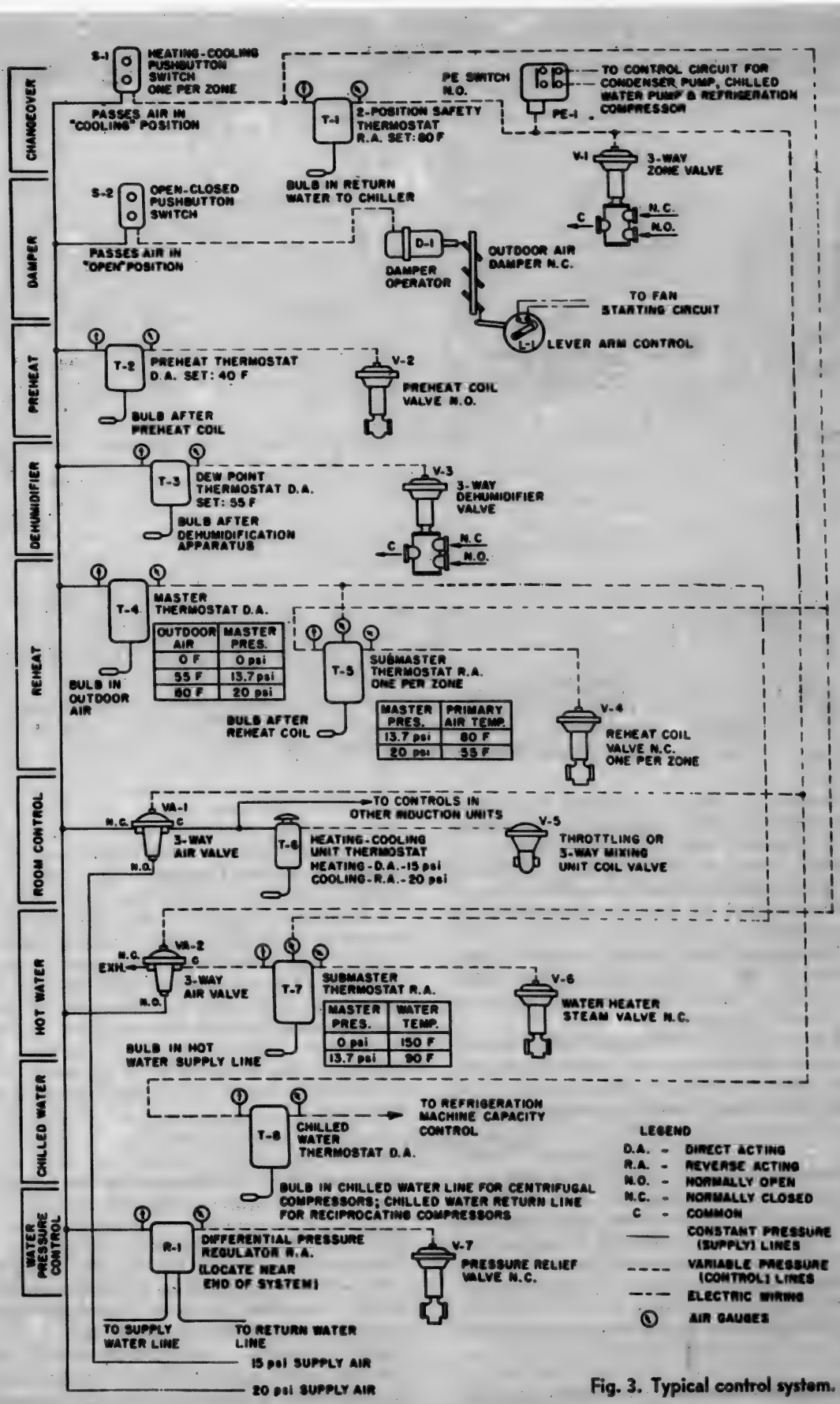
1. An outdoor master thermostat resets a reheat submaster thermostat to modulate the reheat coil valve and maintain a predetermined schedule of delivered air temperature to the conditioned space.

Since the reheat coil normally is used only during the mild part of the cooling cycle, provision is made to fully close the coil valve when the system is changed over to the heating cycle.

2. An alternate method is similar to the preceding, except that a warm-up switch provides a means to fully open the reheat coil valve for early morning warm-up.

Secondary Water Control—Heating—Hot water must be furnished to the room unit coils during the heating season.

1. The common control arrangement provides a variable hot water temperature. An outdoor master thermostat resets a hot water submaster thermostat which in turn modulates the convertor steam valve to maintain a predetermined relationship between water temperaure and outdoor temperature.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V-1 3-WAY ZONE VALVE
C
N.C.
N.O.
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PASSES AIR IN "OPEN" POSITION
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BULB AFTER DEHUMIDIFICATION APPARATUS
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T-6 HEATING-COOLING UNIT THERMOSTAT HEATING-D.A.-15 psi COOLING-R.A.-20 psi
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EXH
T-7 SUBMASTER THERMOSTAT R.A.
MASTER PRES. | WATER TEMP.
0 psi | 150 F
13.7 psi | 90 F
BULB IN HOT WATER SUPPLY LINE
V-6 WATER HEATER STEAM VALVE N.C.
T-8 CHILLED WATER THERMOSTAT D.A.
TO REFRIGERATION MACHINE CAPACITY CONTROL
BULB IN CHILLED WATER LINE FOR CENTRIFUGAL COMPRESSORS; CHILLED WATER RETURN LINE FOR RECIPROCATING COMPRESSORS
R-1 DIFFERENTIAL PRESSURE REGULATOR R.A. (LOCATE NEAR END OF SYSTEM)
V-7 PRESSURE RELIEF VALVE N.C.
TO SUPPLY WATER LINE
TO RETURN WATER LINE
15 psi SUPPLY AIR
20 psi SUPPLY AIR
LEGEND
D.A. - DIRECT ACTING
R.A. - REVERSE ACTING
N.O. - NORMALLY OPEN
N.C. - NORMALLY CLOSED
C - COMMON
CONSTANT PRESSURE (SUPPLY) LINES
VARIABLE PRESSURE (CONTROL) LINES
ELECTRIC WIRING
AIR GAUGES

Fig. 3. Typical control system.

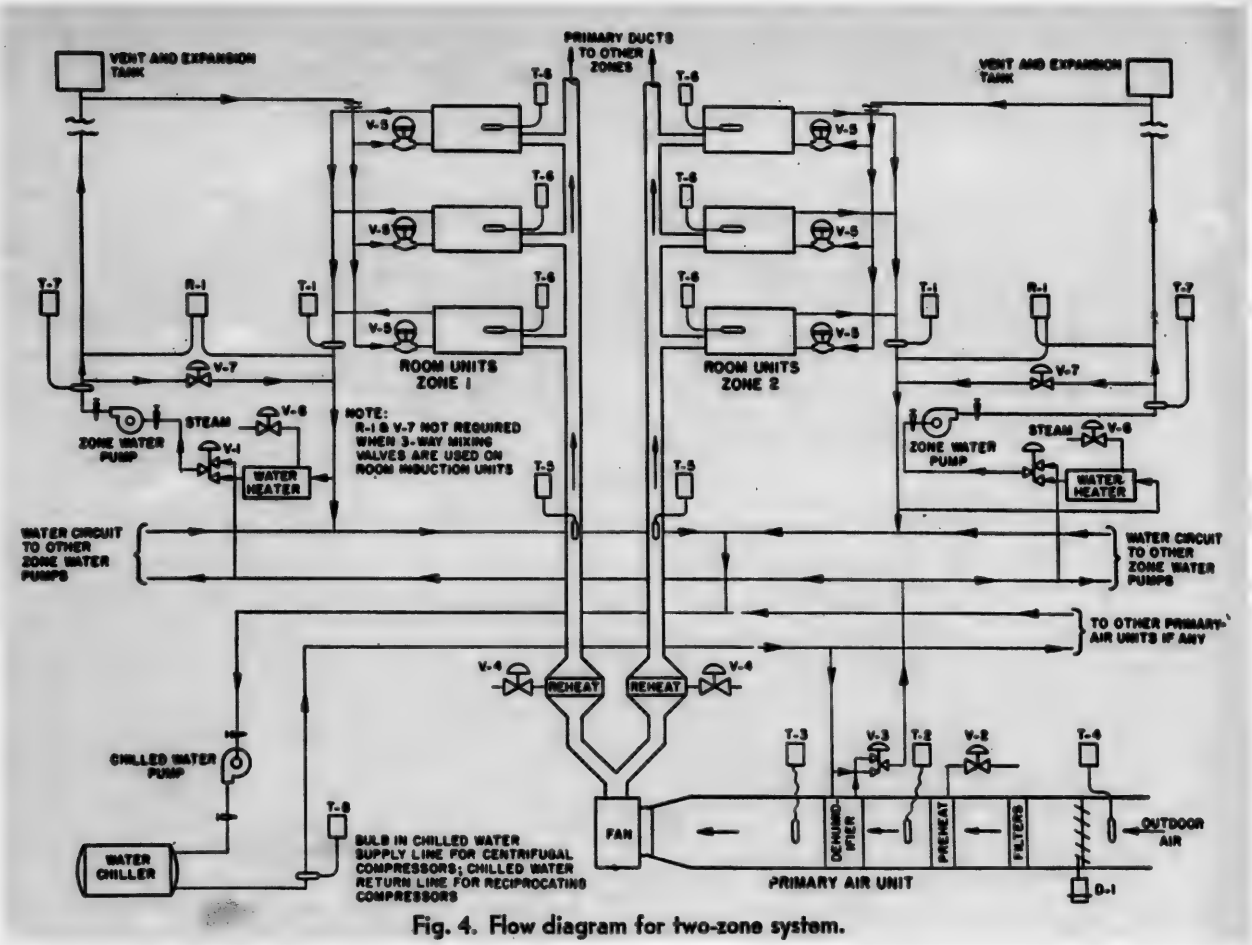


Fig. 4. Flow diagram for two-zone system.

2. An alternate, providing constant water temperature, employs a standard hot water thermostat to modulate the steam valve to maintain the desired temperature.

3. A second alternate provides for a higher schedule of hot water when the units operate as convectors at night. This method uses two hot water thermostats, one set higher than the other.

In all arrangements, since hot water is used only during the heating cycle, the seasonal changeover switch closes the convector steam valve when the system is switched to cooling operation.

Chilled Water Control—Water can be chilled with any of the conventional mechanical refrigeration machines. The chilled water thermostat, its bulb located in the chilled water supply line for centrifugal compressors and the chilled water return line for reciprocating compressors, modulates compressor capacity devices to maintain the design chilled water temperature.

Water Pressure Control—When using two-way throttling valves in the individual room units, pressure control between the main water supply and the return lines must be provided, unless the pump characteristics are such that no appreciable pressure rise results as flow decreases. This also insures a constant flow of water through the chiller when the valves close. If three-way throttling valves are used, this control can be eliminated.

A pressure regulator maintains a constant pressure differential between the supply and the return water lines by modulating a valve in a by-pass between supply and return mains.

THE COMPLETE SYSTEM

In the preceding paragraphs several ways of controlling each section of an induction system are discussed. Figure 3 shows a complete control system employing these methods. Figure 4 shows a schematic arrangement of the system and location of the controls. This is a typical two-zone system. It should be understood that this illustrates only one method of control.

The controls function in the following manner: (Refer to Fig. 4.)

Damper Control—When pushbutton switch *S-2* is engaged, damper operator *D-1* begins to open the outdoor air damper. When the outdoor air damper is nearly open, lever switch *L-1* closes and starts the unit fan.

Winter Cycle—When pushbutton switch *S-1* is in the *Heating* position, the sequence of control will be:

Master thermostat *T-4* resets hot water submaster thermostat *T-7* according to a predetermined schedule. Thermostat *T-7* modulates water heater steam valve *V-6* to maintain the desired hot water temperature.

Preheat thermostat *T-2* modulates preheat coil valve *V-2* to maintain a constant air temperature leaving the preheat coil.

Three-way valve *V-1* is positioned to pass the hot water from the water heater to the zone. Three-way air valve *VA-1* is positioned to index the induction unit thermostats *T-6* to the winter cycle (direct acting). Thermostats *T-6* modulate unit coil valves *V-5* to maintain the desired room temperature.

Summer Cycle—When pushbutton switch *S-1* is in *Cooling* position, the sequence of control will be:

Three-way air valve *VA-2* positions so that water heater steam valve *V-6* closes. When the return water temperature, measured by thermostat *T-1*, drops below the setting of *T-1*, approximately 80 deg F, three-way valve *V-1* positions to allow chilled water to pass to the zone. Pressure electric switch *PE-1* will be actuated and start the condenser water pump. Through electrical interlocks and time delays the chilled water pump will start and the refrigeration compressor can start on a demand from chilled water thermostat *T-8*.

Reheat submaster thermostat *T-5* is reset by master thermostat *T-4* according to a predetermined schedule. Thermostat *T-5* modulates reheat steam coil valve *V-4* to maintain the desired primary air temperature.

Also, three-way air valve *VA-1* will be positioned to index the induction unit thermostats *T-6* to the summer cycle (reverse acting). Thermostats *T-6* maintain a constant room temperature by modulating each of the unit coil valves *V-5*.

The outdoor air will normally be above the setting of preheat thermostat *T-2* and preheat valve *V-2* will be closed. Thermostat *T-3* maintains a constant dew point temperature by modulating dehumidifier mixing valve *V-3*.

Chilled water thermostart *T-8* maintains a constant chilled water temperature by controlling the capacity of the refrigeration equipment.

Pressure regulator *R-1* maintains a constant differential pressure between the supply and return by modulating valve *V-7*. This applies to both the winter and the summer cycles.

Boiler Cleaning Routine May Be Wasteful

Regardless of the type of fuel burned, heat exchange surfaces in a boiler must be kept clean to obtain the full benefit of the heat released in combustion. As much as 10% of the fuel can be wasted because of fouled heating surfaces and plugged tubes (firetube boilers). Some practical cleaning methods suggested by Bituminous Coal Institute, Washington, D. C., apply to small and medium-size plants. Large plants are equipped with specially engineered soot removal systems, and are sufficiently instrumented to enable operators to use them to their full advantage.

Flue Gas Temperature Is Clue

Perhaps the best way to determine when soot removal is required is to observe the normal exit gas temperatures for a particular plant. All that is required for this economical operation is a suitable flue gas thermometer and a few minutes of the operator's time daily. For best results, locate the thermometer on one side of the breeching, rather than top or bottom, as close as possible to the boiler outlet at the upstream side of the outlet damper, without interfering with damper operation.

Clean both fireside and waterside of the boiler thoroughly. After returning the boiler to service, take hourly flue gas temperature readings during peak load periods for a few days, meanwhile removing soot according to previous schedule or routine. Then average the five highest readings taken during that time. If the average reading is, for example, 575 deg F, assume that to be the base flue gas temperature. Whenever the temperature at peak load rises 5% above that figure—or, rounded off, above 600 deg—clean the heat exchange surfaces of soot. Guide figures for other load conditions can be derived in a similar manner.

Normally, flue gas temperature increases gradually, so that once the temperature limit has been established, only a daily check of the thermometer during high load is required to determine the degree of contamination. If tube cleaning does not lower the flue gas temperature, then waterside deposits or high excess air is suspect. Clean the heating surfaces during the low load period following a flue gas temperature rise above the established limit. Clean only as required; routine or scheduled cleaning is either too frequent or too infrequent.

Removing Soot from Watertube Boilers

Medium-size and some small watertube boilers generating steam at pressures above 100 psig usually have manually operated mechanical systems. Most manufacturers recommend that the elements be rotated slowly through three complete revolutions. The best speed of rotation for a particular plant can be accurately determined by observing the flue gas temperature before and after cleaning. Adequate soot blower systems should reduce that temperature 10% immediately after effective cleaning. Actual experience will soon indicate the most effective rotating speed to produce this result within the three turns recommended.

Cleaning Firetube Boilers Without Pollution

To minimize air pollution, it is generally good practice to use a manual device or a vacuum cleaner, now commercially available, to clean the tubes of firetube boilers. During cleaning, the fire (usually stokered) should be banked or burning at a very low rate. At the same time, the damper to the stack should be adjusted to allow only a minimum draft, to relieve the possibility of soot blowing back into the boiler room. In this way, gas velocities through the furnace are maintained at a minimum.

Manually punch or brush tubes from the stackside to the fireside so that any residue will fall back into the furnace or the secondary chamber. When using a vacuum cleaner, loosen soot and clean the full length of the tube with a long wand and steel brush; the loosened residue will then be carried away by the vacuum cleaner, creating no problem in the atmosphere, boiler room or boiler.

Prize-Winning Designs for a Solar-Heated Residence

Here are the three top prize-winning designs in the 1957 International Architectural Competition, conducted by the Association for Applied Solar Energy, for a solar-heated residence. Also presented are the general scope and purpose of the competition, as well as the design conditions and requirements which had to be met.

FOR the purpose of stimulating public interest in the utilization of the sun's energy for man's benefit in his living environment, the International Architectural Competition was conducted in 1957 by the Association for Applied Solar Energy, Phoenix, Ariz. Erection of the residence designed by first-prize winner Peter R. Lee has been completed in Paradise Valley near Phoenix, and the house will become a "living laboratory" for the study of solar heating and cooling. It will also form the center of interest at a symposium for scientists interested in the collection and utilization of solar energy which will be held in Phoenix in the fall of 1958.

Eligibility to compete was determined by registration to practice architecture in the home state or nation of the applicant, or by association with a qualified architect.

Each competitor received a program which contained maps and diagrams showing the Phoenix area, the region where the house will be built, and the actual plot plan. Climatological data, recorded during the year 1956 by the Phoenix Weather Bureau, was given as well as a solar and thermal analysis for the arid southwest area.

The program further specified that the cubic content of the residence should not exceed 20,000 cu ft, and the enclosed floor area should not exceed 2000 sq ft, exclusive of carports and sheltered terraces. It was intended that the total cost of the residence, exclusive of swimming pool, septic tanks, and landscaping, should not exceed $30,000. In this amount was included a $3000 budget for solar equipment.

In addition to the budget set up for the project, a swimming pool will be provided with a capacity of 16,000 gal of water and a surface area of 500 sq ft complete with chlorinating and filtering devices. It was the competitors' responsibility to locate the pool and define its shape to the best advantage of both the building and the total development, and to devise a scheme for tempering the water by sheltering and shading devices.

Besides all the necessary drawings, each entrant was required to submit an explanation of the design and proposed method of operation of the solar heating equipment, with a statement of the estimated heat loss and heat gain. Design weather conditions were to be for winter, 75 deg F inside and 32 deg outside; for summer, 80 deg inside and 106 deg outside. Theoretical optimum tilt angle of solar collector was given as 56.5 deg.

Design Requirements

The program, in outlining the general nature of the residence, stated that it should be designed to accommo-

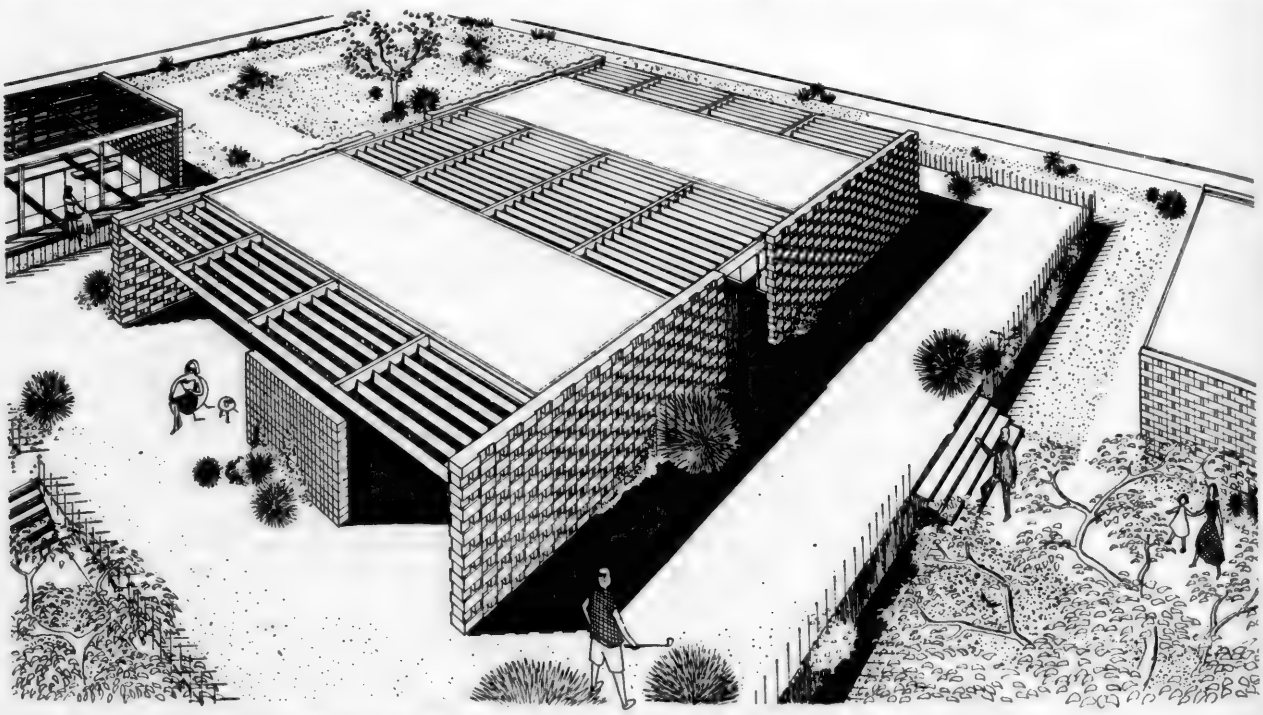


Fig. 1. First-prize winning design by Peter R. Lee of Minneapolis, Minn. Movable louvers over patios and central court constitute solar collector, and automatically adjust daily to most effective tilt angle. Louvers double as reflective shade-producers in summer. Normal heat storage is accomplished with water in insulated underground tank. Swimming pool is utilized as emergency source of winter heat, and for summer pre-cooling of air going to air-to-air heat pumps.

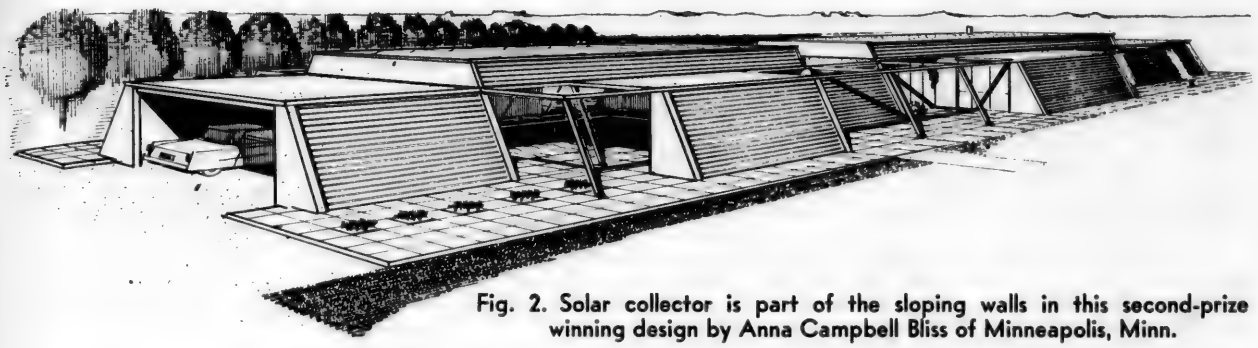


Fig. 2. Solar collector is part of the sloping walls in this second-prize winning design by Anna Campbell Bliss of Minneapolis, Minn.

date adequately a typical Phoenix family, consisting of a husband and wife and two children. The historical and archeological background of the area, while interesting to the occupants of the residence, was not intended to influence the house stylistically; rather, it was expected that the house would express itself in terms of this era's techniques, materials, and concepts. The occupants of the house, having great respect for the sun and its influence on their way of life, would feel strongly that the energy of the sun should be harnessed for the purpose of heating and eventually cooling the house, and also that it should be controlled indirectly for their comfort, enjoyment, and well-being.

It was expected that sufficient solar-collecting area would be provided for:

(1) Domestic water heating system supplying some 200 gal water per day at 140 deg F. An electric immersion heater was acceptable as a solution to the problem of supplying auxiliary heat to the water system during prolonged periods of cloudy weather.

(2) Space heating to provide for the entire heating load during normal winter weather. If the competitor believed it necessary, a mechanical refrigerator of relatively small size was used at a heat pump to supply the auxiliary energy which would be needed from time to time. This same equipment could be used for cooling the residence in summer since air conditioning is essential for comfortable existence in central Arizona.

(3) Heating the uncovered, 500 sq ft swimming pool.

Although the competitor was not limited in his selection of the method of collecting and utilizing solar energy, he was expected to commit the design of the house to a particular system of collection, providing: (a) adequate area for the installation of the solar collecting device; (b) adequate means for the movement of the solar-heated fluid to the storage unit; and (c) adequate space for storage of solar energy.

In addition to the solar energy being collected and stored for direct use in heating and cooling the project, it was felt that the sun should be controlled to create a climatic environment by the design of the residence itself: By orientation, deformation of the volume of the building, the use of color, texture, movable louvers, and shade-creating devices.

Winning Designs

Sixty of the 115 entries were selected for presentation in a book, entitled "Living With The Sun," published by the Association. These include the five prize-winning designs, and three which won honorable mention. Perspective views of the top three prize-winning designs are shown in Fig. 1, 2, and 3, and it is interesting to note in each case how provision for the theoretical optimum tilt angle has been incorporated in the solar collecting device, whether it be in the form of louvers, plates, or part of the wall itself.

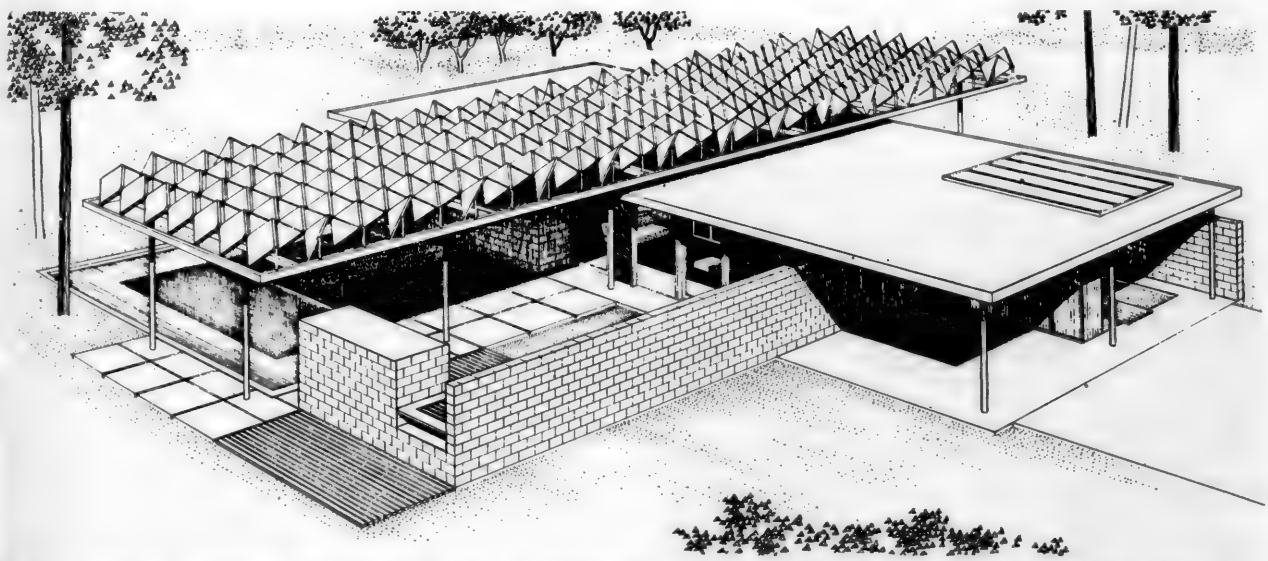


Fig. 3. John N. Morphett and Hanford Yang of Cambridge, Mass., combined efforts for this third-prize winning design. Sloping diamond-shaped plates make up solar collecting device.

Steam Boiler Plant Modernized

FRED M. REITER
Fuel Engineer, Dayton, Ohio

Masonic Temple in Dayton, Ohio, was originally served by coal-burning, stoker-fed, steam boilers. Changes were made to gas and later to oil-fired burners. Boiler room now has six package type steam boilers. The ones used for space heating burn oil or gas, depending on outside temperatures.

NOT many comparatively new buildings have had as many changes in their boiler plant as the one serving the Masonic Temple in Dayton, Ohio. This building is 20 years old and has witnessed three changes in the method of firing, besides several intermediate auxiliary changes between major alterations.

The original steam generating plant consisted of three 200 hp HRT bricked-in boilers, each fired with coal by means of underfeed stokers. Two years after installation, one boiler was converted to natural gas firing, utilizing multi-jet atmospheric type burners, of limited capacity. This change was a test installation for use with light loads, and for supplying hot water and kitchen steam in the summer non-heating season.

About a year later, this light summer load was served by a separate vertical tube Eclipse gas-fired boiler rated at 320 sq ft heating surface, 32 bhp, 100 psig steam pressure. This steam pressure was more suitable for faster hot water heating and for kitchen cooking and dish-washing loads. This boiler was fired with 16 separate multi-port round head atmospheric burners controlled directly by steam pressure on a diaphragm gas valve. Automatic feed water control and low water gas cut-off valves were installed. This boiler operated independently of operators, but it was on the watchman's route of call when used at night. Normally it was for daytime use for hot water and high pressure steam.

Conversion to Oil Firing

The next change was a major operation. Two of the large 200 hp boilers, one gas-fired and one stoker-fired boiler, were converted to oil firing, leaving one reserve boiler still stoker equipped. There was some insecurity in the use of oil; therefore, the desire to have a dual fuel installation. The two oil-fired boilers were normally capable of supplying the space heating requirements of the building, permitting the Eclipse gas-fired high pressure steam boiler to continue to take care of hot water and kitchen steam needs.

Masonic Temple Building, Dayton, Ohio.

The average consumption of oil was 70 gal per hour of No. 5 oil, a heat input of about 10.5 million Btu per hour and an output of 6.7 million Btu in useful steam. Allowing 25% for line, condensate and other losses, this figured an approximate installed radiation of 21,000 sq ft EDR.

A 25,000 gal fuel oil storage tank was installed, buried underground, for fuel oil firing, replacing some of the need for coal storage space, required up to this time.

Early in 1957 a new study of the steam problems was completed. As a result, the three 200 hp brick, coal and oil-fired boilers were entirely removed and six compact package type Titusville horizontal two-pass centerfiring boilers were installed. These new boilers were each rated at 358 sq ft heating surface.

One of these six boilers was designed for 125 psig steam pressure to replace the less efficient 20-year-old Eclipse vertical tube boiler for hot water and kitchen use. This constituted its "commercial" load, with a fairly uniform demand all year around, summer and winter. For this stable load at normal commercial utility gas rates a separate gas meter was installed. Gas could be considered as available at all times without interruption.

Hot Water Load

The large kitchen and dining areas of the Masonic Temple permit serving up to 2,000 meals at one time. Lunch is a daily service, but evening meals vary with the occasion: Meetings, dances, family entertainment or formal lodge meetings and ceremonial gatherings. Steam was required in the kitchen for normal restaurant equipment. High pressure steam increased the speed of kitchen operation.

The service hot water load was extremely variable, following the general pattern of dining room use. At other times building cleaning, personal hygiene and normal hot water demands were scattered. Peaks occurred at meal times with long periods of coasting in between major demands. Two 300 gal hot water storage tanks provide the reservoir or flywheel to cover quick demands.

Removable steam coils, complete with temperature controllers, traps and returns are located within the tanks, and utilize steam from the high pressure steam boiler.

Five of the six new boilers are for building space heating, each boiler rated at 358 sq ft heating surface, capable of producing 66 bhp or about 2280 lb steam per hour from and at 212 deg F at full rated capacity. Normal Ohio State code figures use 12 sq ft heating surface as equivalent to one bhp, so that this steam production would be placed at 220% of code rating. These welded heating boilers produce low pressure steam. Their pop-valves are set at 15 psig.

Design Characteristics

Table 1 supplies the design characteristics, fuel, loading and other features of the steam heating system. The figures cover the use of two boiler combinations of the boilers available. With the former 200 hp installation, three or two boilers might be on the line; with the new package boilers five or four boilers might be used. Design capacities are used in all calculations.

Four of the new boilers appear to give the nearest capacity to 100% of rating. Steam requirements include allowances of 25% for morning temperature pick-up needs and 10% system losses. The fifth serves as a standby for cleaning or service, for rotation of loading, or for expansion of building steam requirements.

The data supplied does provide the basis of a study of the flexibility in the use of a number of units. At any load, the units in use, on the line, operate at design capacity and maximum efficiency. This contrasts to former larger single units in commercial and industrial buildings, perhaps with an equally large spare, that generally means underloading of the total installed capacity or overloading one of two units.

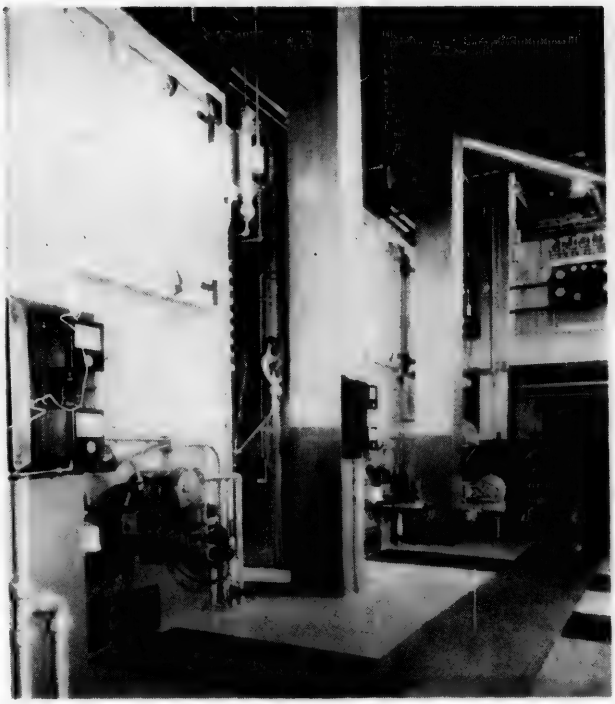
With today's greater knowledge of weather, with the availability of more flexible equipment, and controls that are wider in scope, detail and reliance, designers may give less weight to factors of safety in capacity, and fear of abnormal and record temperatures. The need for three licensed firemen, where legal requirements are met, is questioned; annual operating costs get priority over initial investment.

The new package boilers are fired by means of Petro dual-fuel gas-oil burners that are fitted for rotary injection of the fuel and primary air, mixing rapidly for complete combustion and maximum efficiency within the limited volume of the central firing tube. Gas or oil can be fired at will, but as explained later, the fuel is automatically selected by the weather.

Gas Burners and Controls

The gas burners for each boiler are rated at 2,400 cfh of 1030 Btu natural gas, with an input of 2.47 million Btu per hour capacity. Their oil burning rating is 19.3 gallons of No. 2 distillate oil of about 140,000 Btu per gal., or 2.70 million Btu input capacity per hour.

These burners will burn gas normally until the outside temperature drops below 20 deg, at which point a separate Minneapolis-Honeywell 3-pole control thermostat, mounted outside the building, automatically switches the fuel supply valves on all five heating boilers to oil firing. When the outside temperature rises above 20 deg, firing is automatically switched back to gas. This control temperature is capable of adjustment be-



Three of the old 200 hp boilers that were replaced. The farthest one is coal-fired, stoker fed.

TABLE I—COMPARISON OF OLD AND NEW BOILERS

Item	Former large coal and oil fired boilers		New package dual-fuel fired boilers	
Total boilers used for heating only	3	—	5	—
Number used normally for heating only ...	—	2	—	4
Capacity of each boiler, Bhp rating	200	200	66	66
Total capacities available, Bhp	600	400	330	264
Fuel input capacity of each boiler:				
Gal. fuel oil	35	35	—	—
Cu ft natural gas ..	—	—	2,400	2,400
M-Btu per unit of input fuel:				
Per gallon oil	140	140	—	—
Per cu ft natural gas	—	—	1.03	1.03
Million Btu input capacity per boiler per hr	4.9	4.9	2.47	2.47
Million Btu input for no. boilers used	14.7	9.8	12.35	10.88
Output capacity of boilers used for average load and efficiency	8.82	6.86	9.26	8.16
Installed radiation sq ft EDR	21,000	21,000	21,000	21,000
Million Btu in radiation, at 240 Btu per sq ft	5.04	5.04	5.04	5.04
Boiler output capacity needed for 25% pick-up and 10% losses	7.75	7.75	7.75	7.75
Percent of rated capacity of boilers in operation under design load conditions				

New installation showing package type boilers with control systems integrally mounted.

tween —10 deg and 40 deg. The sixth or high pressure boiler is outside this control system.

This dual fuel firing which is set up to conserve gas in the community at such peak periods for domestic consumers and for non-dual fuel loads, earns the building a special gas rate for its heating load. It avoids the accumulation of abnormal system demands for the gas utility.

In addition to the fuel switching temperature controller, each boiler has an outside M-H thermostat, range 0 to 75 deg which shuts off boilers when the outside temperature reaches the point set for its getting off the line. Each of the five heating boilers has its own outside thermostat for this purpose, set at fixed degree intervals—currently 3 deg steps—so that maximum design capacity of the boilers on the line is utilized. This provides a series of steps of 2,300 lb steam per hour up and down, as one boiler at a time comes on or shuts off in accordance with the need for heat. The first winter of operation, 1957-8, has been an abnormally warm winter up to the first of 1958, as of this writing, which has been advantageous insofar as fuel conservation goes, but not a good test period for boiler and control operations.

Under the former set-up of three 200 hp boilers, three steps in boiler generation at rated capacities were in terms of 6,900 lb steam per hour, thrice that of the new smaller boilers. In mild weather, this would be a disadvantage. Savings also occur in lower power costs of small individual boiler feed pumps, forced draft fans and all auxiliary equipment.

At the same time, break-down of gross capacity into units not exceeding 358 sq ft heating surface each, eliminates the need for licensed boiler room attendants. The Ohio State code sets 359 sq ft heating surface as the break-point above which licensed firemen must be in attendance. This is of vital importance to a public building that must be open evenings, requiring practically three operation shifts, for less than 8 hours of actual use per average day. Other labor problems are avoided.

Boiler Operation

Each boiler is a complete unit in itself. Each has its own feed water pump, boiler water level controller and low water fuel cut-off, power units and limit switches that shut the boiler down completely if any unit in the sequence of control operation finds its function unsatisfied. Once shut down for any water, fuel, flame, temperature or other failure, the lighting sequence must be started by hand; by an operator who has had an opportunity to seek out the cause of failure, that shut the boiler down and won't start it up again without correction.

The starting push-button starts up the forced draft fan for a 30-second time delay for purging gases out of the boiler, before electric spark ignition starts and the gas pilot valve permits gas in the pilot burner to ignite. When the electric eye sees the pilot flame, the main fuel burner will open to permit full firing, provided all other conditions of water level, temperature, etc., are satisfied, and their limit switches are in their closed positions. This provides good operation.

Failure of any step in the proper sequence shuts all fuel off. A breaker at any point breaks all circuits. Each boiler stack connection has its own 13-inch field balanced damper draft controller located in the 8 x 30-inch boiler flue outlet.

The integral control panel located to the left in the front of each boiler has all instruments and controls centrally located. Gas control valves are General Control products, 2½-inch for each boiler main connection and ⅜-inch for the pilots. The gas header main is 6-inch pipe. The gas enters the building at about 10 psig pressure, passing through a 5 x 15, 23,000 cfh capacity, Connersville rotary gas meter before a regulator reduces the gas pressure to 7-inch water column.

Steam outlets are 6-inch on the five 15 psig heating boilers and 2-inch on the 125 psig high pressure boiler. Initial tests on one of these boilers, clocking 2400 cfh gas firing and zero draft, gave 9% CO_2.

The photographs reproduced show the old and new boiler rooms—actually the same room with two different sets of boilers. The high degree of maintenance and good housekeeping indicate that regardless of the type of fuel used, it is possible for operators to maintain a clean boiler room.

HEAT LOSS THROUGH WOOD WINDOWS

Heat is lost via windows in two distinctly different ways. The first is by conduction through the glass, the second is by leakage of cold air around the cracks of the movable sash or sections of windows. There is also some leakage around the frames of the windows but usually this is not substantial and may be ignored in most heat loss calculations.

Loss through Glass

Ordinarily the U value for vertical glass windows is taken at 1.13 Btu per (sq ft) (hr) (deg temperature difference) based on a 15 mph wind velocity. In the rare cases where the glass is horizontal, the U value is 1.40 when the heat flow is upward. Where two vertical sheets are separated by a ¼ inch air space, U = 0.61 and if the air space is ½ inch, U = 0.55. Values of U for hollow glass block range from 0.55 to 0.60.

Strictly speaking, the area of the window opening occupied by the wood sash should be calculated separately from the area occupied by glass. Actually, it is almost universal practice to calculate the loss through the entire window sash opening as if it were all occupied by glass, and this has been done in the tables which follow.

Loss by Infiltration

In determining the heat lost by infiltration around windows, it is customary to size the heating equipment for each room based on infiltration through the worst possible combination of infiltration from two adjacent walls. On the other hand, the capacity for the whole building need not necessarily be the sum of capacities needed for individual spaces, on the theory that if there is infiltration on one or two sides of a building, there must be exfiltration on other sides. With mechanical air systems, however, where the interior of the building may be under slight pressure, there can be exfiltration even on the windward side.

The heat lost per hour by infiltration is

$$q \times .075 \times .24 \times (t_i - t_o) \times L \qquad (1)$$

where q is the cubic feet per hour of leakage per foot of crack, .075 is the density of air in pounds per cubic foot, .24 is the specific heat of air, Btu per pound per degree, t_i is the inside air temperature, t_o the outside air temperature, and L the lineal feet of crack.

Tabular Data

The tables which follow are tabular solutions of equation 1 for standard size double-hung wood windows and wood casement windows for a temperature difference of 70 deg. The standard sizes are those given in Commercial Standard 163-52 of the Department of Commerce and covering standard stock Ponderosa pine windows and sash.

The following points should be noted by those using the tables:

(1) The tables give the heat loss for a 0° to 70° temperature difference. It is a simple matter to correct for other temperature differences in totals by applying correction factors given in Table 1.

Table 1. Correction Factors for Temperature Differences Other than 70 Deg

Design Temperature Difference, Deg. F	Multiply Table Value By
40	.57
50	.71
60	.86
70	1.00
80	1.13
90	1.29
100	1.43

(2) The window opening has been calculated as being all glass, rather than calculating the wood sash separately. The error here is, of course, on the conservative side.

(3) A value of 39 for average non-weatherstripped wood windows and 24 for weatherstripped wood windows has been used for q in equation 1.

(4) The value of 1.13 for U was used in calculating the heat loss through the glass.

(5) The total values to the right of the tables are the total of the transmission loss and the infiltration loss.

(6) The tables for both casement and double-hung wood windows apply to all combinations of number of panes for the given size opening. The lineal feet of crack for casements is the perimeter of the opening; for double hung windows it is the perimeter of the opening plus the width of the opening to provide for the crack at the meeting rail.

HEAT LOSSES (0° TO 70°) THROUGH WOOD CASEMENT WINDOWS

Opening, Ft. and In.		Area, Sq. Ft.	Heat Loss through Glass, Btu per Hr.	Crack, Ft.	Infiltration Loss, Btu per Hr.		Total Window Loss, Btu per Hr.	
Width	Height				Weather-stripped	Not Weather-stripped	Weather-stripped	Not Weather-stripped
0'11½"	2'6"	2.40	190	6.92	208	339	398	529
	2'10"	2.72	215	7.58	227	371	442	586
	3'2"	3.04	240	8.26	248	405	488	645
	3'6"	3.36	266	8.92	268	437	534	703
	3'10"	3.68	291	9.58	287	469	578	760
	4'2"	4.00	316	10.26	308	503	624	819
	4'6"	4.32	342	10.92	328	535	670	877
	4'10"	4.64	367	11.58	347	567	714	934
	5'2"	4.96	392	12.26	368	601	760	993
1'3½"	2'6"	3.23	255	7.58	227	371	482	626
	2'10"	3.65	289	8.26	247	405	536	694
	3'2"	4.09	324	8.92	268	437	592	761
	3'6"	4.52	358	9.58	287	469	645	827
	3'10"	4.94	391	10.26	308	503	699	894
	4'2"	5.38	426	10.92	328	535	754	961
	4'6"	5.81	460	11.58	347	567	807	1027
	4'10"	6.23	493	12.26	368	601	861	1094
	5'2"	6.67	528	12.92	388	633	916	1161
1'7½"	2'6"	4.05	320	8.26	248	405	568	725
	2'10"	4.58	362	8.92	268	437	630	799
	3'2"	5.14	407	9.58	287	469	694	876
	3'6"	5.67	448	10.26	308	503	756	951
	3'10"	6.20	490	10.92	328	535	818	1025
	4'2"	6.76	535	11.58	347	567	882	1102
	4'6"	7.29	577	12.26	368	601	945	1178
	4'10"	7.82	619	12.92	388	633	1007	1252
	5'2"	8.38	663	13.58	407	665	1070	1328
1'11½"	2'6"	4.90	388	8.92	268	437	656	825
	2'10"	5.55	439	9.58	287	469	726	908
	3'2"	6.21	491	10.26	308	503	799	994
	3'6"	6.86	543	10.92	328	535	871	1078
	3'10"	7.51	594	11.58	347	567	941	1161
	4'2"	8.17	646	12.26	368	601	1014	1247
	4'6"	8.82	698	12.92	388	633	1086	1331
	4'10"	9.47	749	13.58	407	665	1156	1414
	5'2"	10.13	801	14.26	428	699	1229	1500
2'3½"	2'6"	5.73	453	9.58	287	469	740	922
	2'10"	6.48	513	10.26	308	503	821	1016
	3'2"	7.26	574	10.92	328	535	902	1109
	3'6"	8.02	634	11.58	347	567	981	1201
	3'10"	8.77	694	12.26	368	601	1062	1295
	4'2"	9.55	755	12.92	388	633	1143	1388
	4'6"	10.31	816	13.58	407	665	1223	1481
	4'10"	11.06	875	14.26	428	699	1303	1574
	5'2"	11.84	937	14.92	448	731	1385	1668

(Continued on next month's Data Sheet)

Forced Warm Air Reheat System

Designed for Student Service Building

Factors in the design of a forced warm air heating system for a student building, and features of the system that was installed to best serve this application.

A DUAL heating forced warm air reheat system, consisting of separate mechanical systems installed in the basement and in a penthouse, serves the new Student Service Building of Michigan State University. The two units are connected by a common lobby and with air supplied from plenums in the basement and above corridor ceilings. Air return is through a continuous slot base along the outside walls.

Major heating system requirements in the building design were low first cost, quiet operation, and possibility of adding cooling with minimum alterations at some future date.

Quiet operation is essential because of a number of small rooms, side by side around the perimeter of the placement and counseling areas on the first and second floors. Their use for confidential interviews requires a low noise level. With future air conditioning in mind, space has been provided in air handling units for cooling coils and roof space has been allocated for a penthouse addition to house future water chillers and cooling towers. The building has double glazing throughout, except in stair halls and lobbies.

Details of the Design

According to the consulting mechanical engineers who designed the heating and ventilating system, four separate air supply systems are actually used in this installation, two for each wing of the building. Compactness is achieved by using a basement system for heating and ventilating the basement and first-floor rooms, with a penthouse system supplying the second and third floors.

This arrangement minimizes the amount of wall space required for ducts to individual rooms and results in a substantial gain in actual usable floor space.

Tempered and filtered air is supplied to basement and first-floor rooms through a sub-basement plenum chamber, Fig. 2, and to second and third floor rooms through plenum chambers in the space above the corridors. The

Fig. 1. Student Services Building at Michigan State University served by a basement and penthouse system.

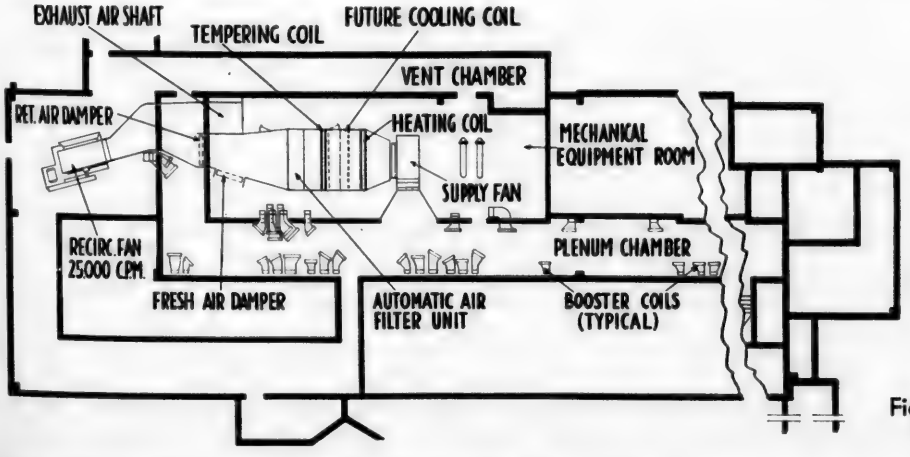


Fig. 2. Sub-basement plan of heating and ventilating system.

Fig. 3. Interior of sub-basement plenum chamber. Note walk-through feature for easy maintenance.

sub-basement plenum, Fig. 3, is deep enough to permit upright walking access to the major piping systems in the building as well as to the booster coils. This is a distinct advantage over the system wherein access doors must be provided for maintenance and repair operations.

Intake air is a mixture of fresh and recirculated air, controlled to an air intake temperature of 40 deg F. A thermostatically controlled damper determines the amount of recirculated air required. A constant volume recirculation and exhaust fan is used; excess air not required for mixing is discharged to the outside.

Following mixing, supply air is tempered by passing through a steam coil. It is then drawn through a filter arrangement; through a reheat steam coil, and finally into the constant volume supply fan. The tempered, filtered air is delivered directly into the plenum chamber for distribution to the duct branches that lead to individual rooms.

The intake portion of each duct branch is supplied with a hot water booster coil. Water temperature leaving the converters is automatically varied by an outdoor master thermostat in proportion to outdoor temperature conditions. Automatic room thermostats permit individual regulation of temperature through control of the volume of water passing through the booster coils.

Recirculation and supply fans used in the basement systems are large, single wheel units. The penthouse arrangement, while contributing to space conservation within the building proper, presented a problem relative to architectural design. The architect, Ralph R. Calder of Detroit, preferred a low silhouette. To use fans of this type installed in the basement system would have destroyed the desired effect, therefore Double-wheel multiple fan units were used in the penthouse to cut height and achieve a low silhouette.

The system is designed for future air conditioning of the building. This will require the insertion of cooling coils, after the filters, to cool and dehumidify the air, and the addition of water chiller units in an additional penthouse to obtain chilled water. Conditioned air at a temperature of approximately 58 deg would be carried through the supply fan and into the plenum chamber. The hot water circulated in the booster coils would be maintained at a reduced temperature to prevent undue heat gain to the air. The booster coils for summer operation will reheat the cooled air to produce the desired room temperature. The same room thermostats will be used to control the summer and winter reheat cycle.

Another point of interest is the use of a continuous baseboard slot for return air in all perimeter rooms, Fig. 4. Undue drafts in the room are prevented. This avoids cost of the more conventional split system using convector heating along outside walls. The space above the first floor corridor is used for return air from second and third floor rooms. A single air shaft carries return air back up to the penthouse system for recirculation or exhaust.

This system has 15 American Blower units varying in capacity from 1,750 cfm to 30,000 cfm, operated respectively by 1 to 15 hp motors.

Other credits are steam and hot water coils, Aerofin Corp.; air filters, American Air Filter Co.; water circulating pumps and hot water specialties, Bell & Gossett Co.; supply and exhaust grilles and registers, Barber-Colman Co.; automatic temperature controls, Johnson Service Co.

Consulting mechanical engineers were Snyder & McLean, Inc., Detroit, Mich.; architect, Ralph R. Calder, Detroit, Mich.

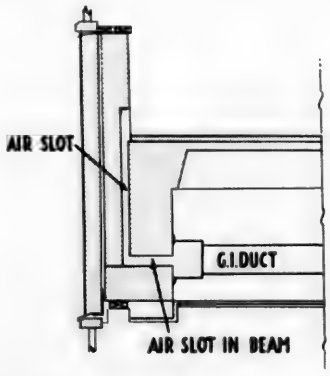


Fig. 4. Section through typical first floor exterior wall to show how beam is slotted at return air duct locations to pass return air collected by the baseboard slot.

Oil Heat and Air Conditioning Show to be Held in June

Plans are being completed for the 22nd National Oil Heat and Air Conditioning Exposition which is to be held on the street floor of the Coliseum, New York City, June 9 to 12. The theme of this show is, "Enter the Profitsphere in '58."

In addition to new products in air conditioning and oil heating, seven major oil companies will display improved heating oils.

As a special attraction, the show will have an auditorium where technical-service sound-slide films will be shown at regular intervals to help train technicians.

To further attract attendance, the 36th annual convention of Oil-Heat Institute of America will be held at the Park Sheraton Hotel, New York City, June 10 to 12.

AIR CONDITIONING, HEATING and VENTILATING'S

REFERENCE SECTION

MAY, 1958

High Velocity Dual Duct Systems for Multi-Zone Installations

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Design, layout and installation practice for high velocity dual duct systems. Part 2.

High Velocity Dual Duct Systems for Multi-zone Installations

N. S. SHATALOFF
Consultant, Buensod-Stacey, Inc., New York, N. Y.

The second of two reference sections presenting a discussion of problems associated with design, layout and installation practice for high velocity dual duct systems. These articles cover construction details for rectangular high pressure ducts, design procedure and information of value to both the designing engineer and contractor.

DEVELOPMENT of the basic scheme of air distribution suitable for a particular structure is the most important function in the design of a dual duct system. The first cost, owning and operating cost, and future flexibility will always reflect the skill with which the basic planning of the system is executed. In every installation, several schemes of air distribution will be feasible and a careful evaluation of all schemes must be made before selecting the one most suitable for the installation.

The cost of the duct system forms a relatively large part of the cost of the total installation. If the system is simple, the weight of metal in the duct system may be 1 lb per square foot of conditioned area. If the system is complex, with long runs of low capacity, this weight may rise to 3 or 4 lb. Assuming the erected cost of metal with its associated components to be $1.00 per lb of metal, the penalty for a complicated arrangement becomes obvious. Special effort should always be made to achieve simplicity in the duct system, by utilizing structural and architectural features of the building, judicious location of risers, mains, and apparatus room.

As pointed out in the section on Design of Dual Duct Systems, Part 1 of article, overpressurizing of the system should be avoided in all installations. High pressures are always associated with higher owning and operating costs and, in addition, magnify noise and vibration problems. Bear in mind that the actual increment cost of a larger duct is not an average cost of the ductwork but consists mainly of the added cost of the metal and can be assumed to be only 15 to 20 cents per pound.

The cost of the installation is greatly affected by the general zoning arrangement of the system. If the structure is subdivided into many small zones, when larger zones would meet the objectives of the design, the increase in the installed cost of the system represents a very substantial amount of money. In existing buildings, it will be more economical to leave the existing perimeter radiation system as it is and to condition all spaces with overhead units.

In some installations only part of the structure must be conditioned, but provisions for treating the remainder must be incorporated in the design. Existing buildings with large numbers of tenants are often treated in this manner. A dual duct system with automatic volume regulation at terminal points is ideally suited for installations of this type. If the central apparatus and duct mains are installed, any part of the building may be provided with mixing units and the system put into operation prior to its entire completion. When additional units are installed, no rebalancing of the original units will be necessary, as all changes in duct pressures will automatically be compensated for at the terminal points.

Typical Floor Layouts

The general patterns of air distributing systems customarily used in dual duct layouts are illustrated in Figs. 14, 15, 16 and 17. Figure 14 shows a typical floor of an office building arranged for a minimum recommended number of zones. The basic minimum number of zones in a building of rectangular shape should be as follows:

a. Four exposure zones.
b. Four corner rooms with windows in two walls.
c. Interior zones as required by type of loading or occupancy.

In modern buildings, the need for zoning of interior areas with heavy population and business machinery loads is actually greater than in exterior areas of the same exposure. The basic need for zoning exterior areas exist only when that side of the building is partially shaded by the adjacent structures or selective temperature control is needed for each room. The arrangements

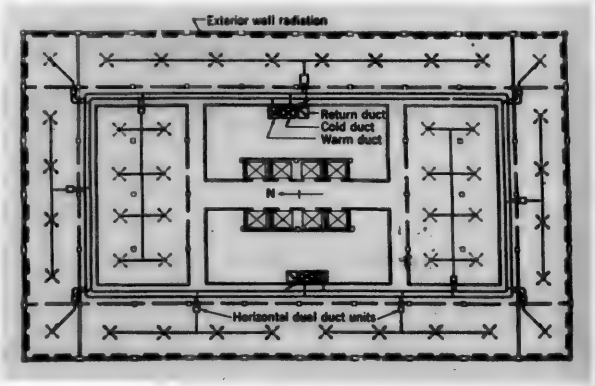


Fig. 14. Typical office building dual duct layout with supplementary radiation at exterior wall with minimum number of zones.

shown in Fig. 14 is supplemented by perimeter radiation for winter operation, which may be controlled independently or in conjunction with the air conditioning system. The system arranged in this manner obviously will be the lowest in first cost and could be applied to both new and existing buildings for conditioning open floors or non-executive areas. Each large zone may consist of a separate mixing unit or of two or more units discharging air into a common duct, as shown on the west side of the building. If the ductwork is arranged in the manner shown, any change in future zoning arrangement can be easily accomplished by installing additional mixing units where required.

Figure 15 shows basically the same layout as indicated on Fig. 14, with the exception that all spaces are equipped with individual mixing units for selective temperature control. If the horizontal duct mains are properly arranged, future changes in mixing units and zone arrangement are easily made without disturbing the main system. When mixing units are equipped with volume regulators, no re-balancing of units will be required if the pattern of air distribution is changed. In some cases, the mixing units are arranged on a modular basis providing one mixing unit for each modulus. A design executed in this manner has the merit of greater flexibility for future partition changes and should be considered for installations where this is expected.

Figure 16 illustrates a typical layout with exterior zones supplied by under-window air mixing units. The units may be connected to vertical risers, as shown in Figs. 21 and 22, or to horizontal mains located at the ceiling or on the floor below, as shown in Fig. 23. The vertical risers for exterior units are usually collected on one or more floors to form a separate distributing header or loop. The exterior zones might be supplied by a separate air handling system or be a part of the interior system. When under-window units are connected to horizontal ducts located at each floor, these ducts in turn are connected to horizontal supply mains feeding interior spaces.

When space is not available under the windows for the installation of self-contained units or when the exterior wall, for reasons of economy, is sub-divided into large moduli, the exterior can be supplied by overhead units located at the ceiling or on the floor below, as shown in Fig. 17. The air from the overhead unit is discharged

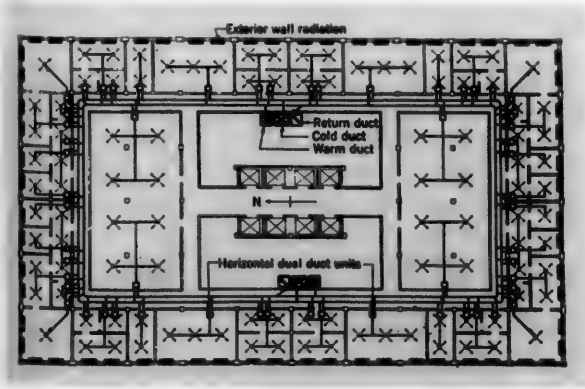


Fig. 15. Typical office building dual duct layout with supplementary radiation at exterior walls, zoned to provide selective temperature control for each enclosure.

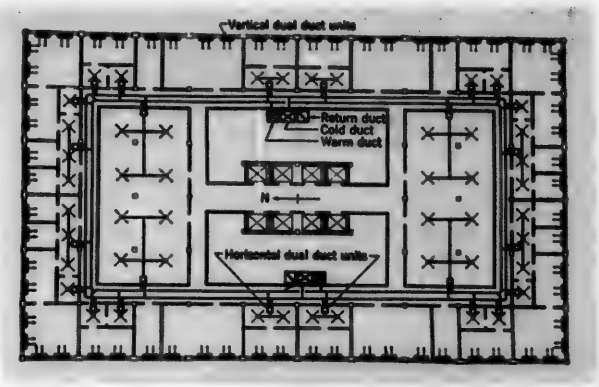


Fig. 16. Typical office building dual duct layout, 100 per cent air system, zoned to provide selective temperature control for each enclosure with vertical dual duct units at exterior walls.

into a distributing and sound attenuating header located at the perimeter of the building. Connection to the distributing header may be made at its end, if the mixing units are located at the ceiling as indicated in Fig. 17.

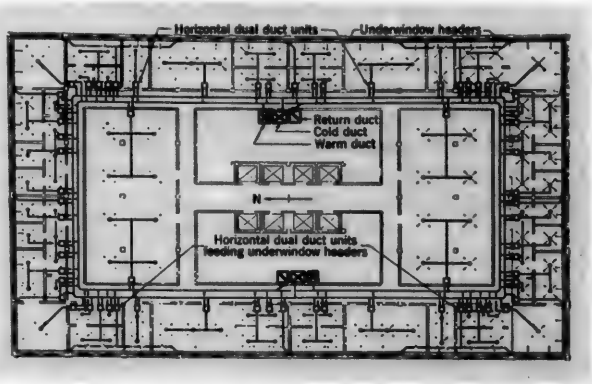


Fig. 17. System similar to Fig. 16 but with exterior wall headers fed by horizonal units to take care of skin effect of building only.

If the mixing units are on the floor below, the connections may be made in the center of the header, as shown in Fig. 24. The chief objective of the distributing headers, as shown in the layout, is to prevent down drafts during cold weather. They are sized to take care of only a part of the total heating load. Selective temperature control is accomplished by the overhead units feeding corresponding areas. The exterior wall headers can be omitted in warmer climates.

The high pressure horizontal supply ducts feeding individual floors may be arranged in a conventional manner or form a system of loops, as shown in Figs. 14, 15, 16 and 17. The loop system has an obvious advantage when the floors are supplied by more than one central air handling apparatus. If the air flows freely through the ends of the loops from one side of the building to the other to satisfy the sun load, appreciable economy is effected in designing the cold circuits of the central apparatus. With the loop system, the combined coil capacity of all apparatus is sized to take care of the peak of the entire building. If two separate apparatus feed the building, one the east and another the west side, each

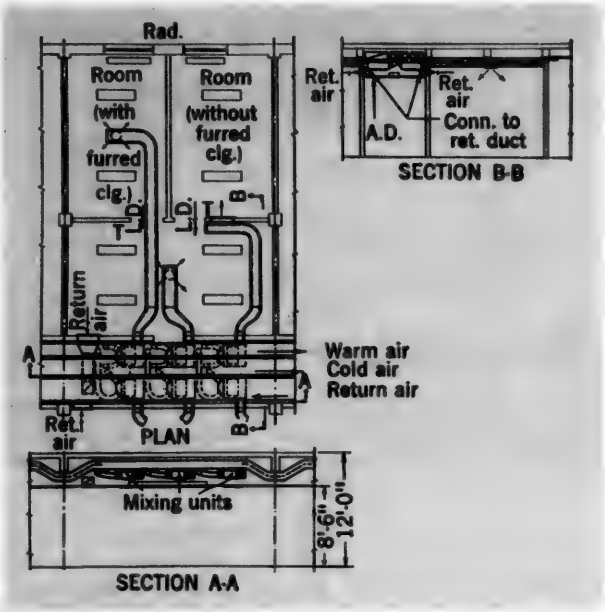


Fig. 18. Typical arrangement of horizontal dual duct units with units and ducts located in corridor.

apparatus must be designed to provide for the peak load of its side of the building.

With more than one apparatus supplying a building, combined by looping the supply ducts, each central apparatus can be the same size, thus simplifying the layout work and providing a saving in the first cost of the installation by a duplication of equipment. The looped system also permits partial conditioning of the building by operating only half of the central fans for night, week end operation, or during a breakdown.

Experience has shown that the best location for high pressure ductwork and mixing units is in corridors or in areas adjacent to the service core of the building. A typical corridor arrangement of units is illustrated in Fig. 18 where six units are placed in the corridor ceiling in a typical 20 ft bay to supply three separate zones on each side of the corridor. This is the maximum number of zones required for most structures with overhead distribution. Tap-offs from high pressure mains are usually on the bottom side of the ducts to facilitate future changes in the arrangement of the units. When required, the return ductwork can be placed in the corridor, as shown in Fig. 18, or it may be moved to adjacent areas, as shown in Fig. 19. Whenever high pressure ductwork is offset around the beams to provide space for mixing units, as indicated in Fig. 18, the ductwork should be provided with well designed streamlined vanes. If space for the installation of units is not available in the corridor, the unit can be moved to adjacent spaces as shown in Fig. 20.

A dual duct layout will be greatly simplified if the return air system is arranged as shown in Figs. 14, 15, 16 and 17. If the space above the hung ceiling is used for a return air plenum, all return air may be drawn into the ceiling plenum through conventional grilles or registers and collected at central points near the risers. In some designs, it is sufficient to use as return plenums only the space above corridor ceilings where, normally, high pressure ducts and units are located. It should be pointed out, however, that local codes in some cities prohibit or restrict the use of hung ceilings for return plenum chambers.

The most critical points in a dual duct system will generally be the areas near the main shaft where the ducts enter a floor and branch off into horizontal mains. A careful study of space conditions must be made in these areas and the ducts sized at the lowest velocity possible. The duct crossovers at the shafts, as shown in the layouts of Figs. 14, 15, 16 and 17, are not always possible due to limited available space. To avoid crossovers of horizontal mains, the risers can be rearranged by dividing the warm riser and placing a cold riser between two warm risers.

A Few Don'ts

1. In laying out distributing system do not simply follow the technique used in low pressure layouts by running high pressure ductwork over an entire conditioned area. Limit the extent of high pressure mains on each floor to well defined areas and distribute air to individual rooms by low pressure internally lined ductwork. Consider the high pressure ductwork as a high velocity plenum which remains intact for the life of the structure. In order to have maximum future flexibility and to avoid the danger of obsolescence, all future changes due to shifting loads and partition changes should be confined to low pressure ductwork and mixing units.
2. Do not use a large number of small perimeter

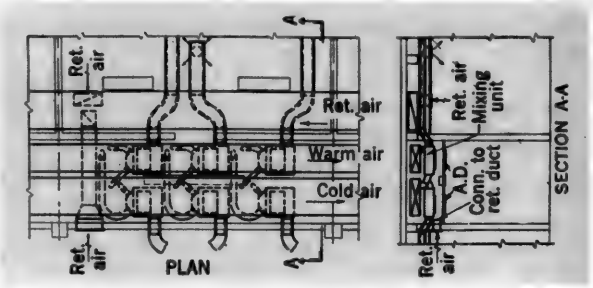


Fig. 19. Typical arrangement of horizontal dual duct units. Units and supply ducts are located in corridor; return duct in conditioned spaces.

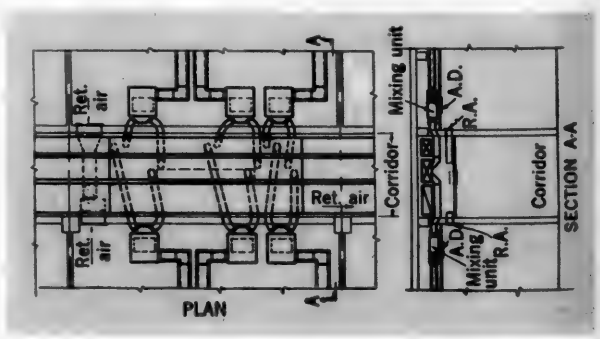


Fig. 20. Typical arrangement of horizontal dual duct units. Ducts are located in corridors; mixing units in conditioned spaces.

under-window units unless absolutely necessary by conditions of design. A layout made in this manner will be the highest in first cost. (See section on Budget Costs for Dual Duct Systems.)

3. In making alternate air distributing schemes for a particular project, do not rule out a scheme consisting of perimeter radiation and overhead air system. On many projects such a scheme will be the least expensive in first cost.
4. Do not use overhead mixing units of small capacity unless absolutely necessary for zoning requirements. In order to decrease the cost of installation, use a larger unit and distribute the air to individual outlets by low pressure lined ductwork. (See section on Budget Costs for Dual Duct Systems.)
5. Do not scatter dual duct mixing units at random through entire air conditioned area. Attempt to place the mixing units as close to the high pressure mains as possible. It will facilitate future changes and servicing.
6. Do not design or shape the high pressure duct system from consideration of present loads only. Consider the possibility that the internal loads may increase or change in the future and the supply fans will have to be speeded up or a new booster air handling system is to be connected to the distributing system. With high pressure dual duct systems, the provisions for future adequacy of the installation can be made at a very small additional cost.

DUAL DUCT AIR HANDLING APPARATUS

In a majority of cases the dual duct central apparatus is based on one of the four basic cycles described in Part 1. Minor modifications of the cycles and equipment might be dictated by design conditions. There are no general or special rules which should be followed in the selection of the equipment or shaping of the apparatus

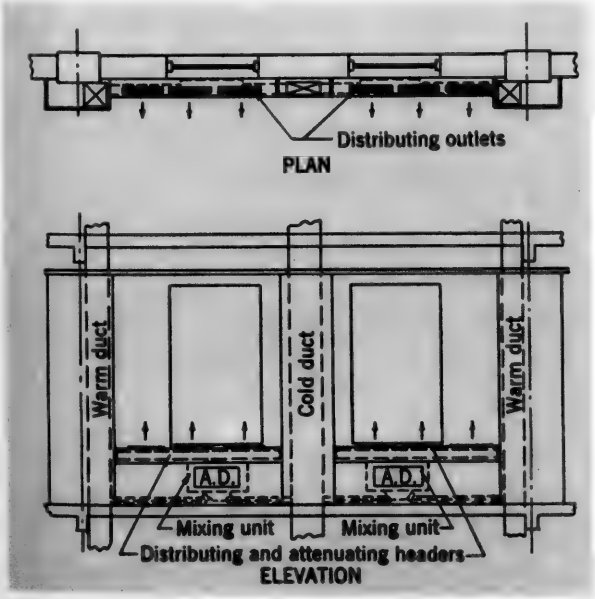


Fig. 21. Arrangement for vertical underwindow dual duct units connected to vertical risers—one unit per riser.

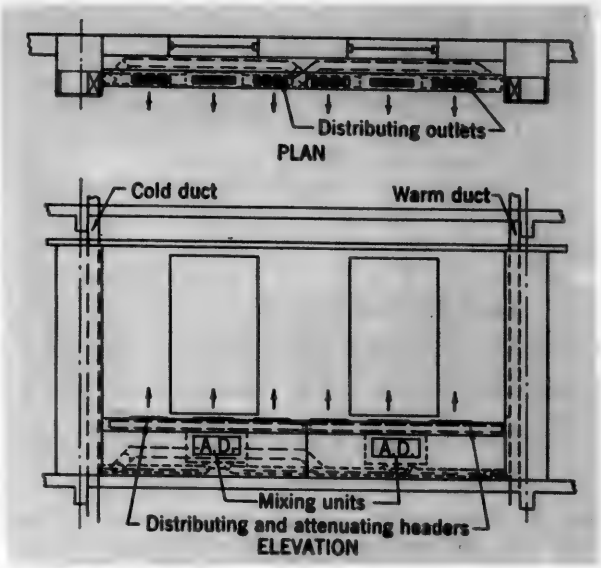


Fig. 22. Arrangement for vertical underwindow dual duct units — two units per riser.

casings. The judgment of the design engineer and manufacturers' recommendations will determine the type, size and quality of the component parts forming the central apparatus. All mechanical equipment is of standard manufacture as used at present by the industry. However, there are several points which should be given special consideration in designing a push-through high pressure apparatus of dual duct type. These will now be discussed in detail.

Apparatus Floor Area

Apparatus floor area constitutes a large part of the total owning and operating cost of any type of air conditioning system. An improperly planned apparatus room may involve waste in floor area which could represent an element of cost greater than the cost of all mechanical equipment in it.

A well planned dual duct apparatus room can be fitted into a space no more than 1½ to 2½% of the net area it conditions. Such economy in floor area is due to the following factors:

1. Zoning and multiplicity of apparatus systems is not required for dual duct systems and a larger central apparatus may be used which will always take less space than several small systems of equal capacity.
2. By supplying the cold air at lower temperatures, the total air supplied is greatly reduced. With 50 deg air in the cold duct, the size of the central apparatus is only 60 to 70% of one using 60 deg air.
3. The use of vertically split cold and warm chambers, as shown in Figs. 25 and 26, allows the piping to the cooling coils to be placed in the passage for warm air, saving 2½ to 3½ ft of space on each side of the bank of cooling coils.
4. By using the full height of room for banks of coils and filters, floor area is saved.

Figures 25 and 26 show typical apparatus rooms for dual duct systems of medium and large capacities. The

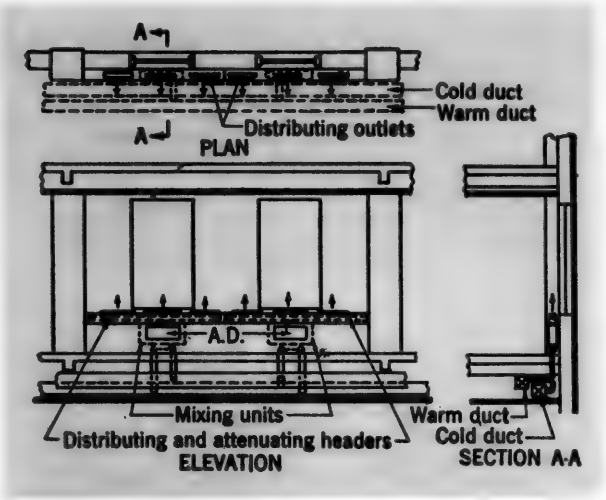


Fig. 23. Arrangement for vertical underwindow dual duct unit connected to horizontal mains.

equipment of Fig. 25 takes 1.9% of the area it serves and that of Fig. 26 only 1.4%.

In Fig. 25, the parts of the system illustrated are as follows: 1. Supply fan, 50,000 cfm total; 2. Return and relief fans, 40,000 cfm, total; 3. Cooling coils, 80 sq ft total; 4. Heating coils, 45 sq ft total; 5. Supply fan motor; 6. Return fan motor; 7. High pressure dehumidifier; 8. Outdoor louvers and screens; 9. Filters; 10. Preheaters; 11. Low pressure access doors; 12. High pressure access doors; 13. Relief dampers; 14. Minimum outside air damper; 15. Maximum outside air damper; 16. 1 inch sound lining; 17. 4-inch sound lining; 18. Perforated distributing plate; 19. Return air damper.

Parts of the apparatus room illustrated in Fig. 26 are: 1. Suppy fans, 140,000 cfm total; 2. Return and relief fans, 110,000 cfm total; 3. Cooling coils, 230 sq ft total; 4. Heating coils, 130 sq ft total; 5. Supply fan motors; 6. Return fan motors; 7. High pressure dehumidifier; 8. Outdoor louvers and screens; 9. Filters; 10. Preheaters; 11. Low pressure access doors; 12. High pressure access doors; 13. Relief dampers; 14. Minimum outside air dampers; 15. Maximum outside air dampers; 16. 1 inch sound lining; 17. 4-inch sound lining; 18. Perforated distributing plate; 19. Return air dampers.

Back-Lash and Carry-Over

Due to unequal distribution of velocity over the face of the cooling coils in the push-through type apparatus, the carry-over of moisture in the cold chamber and back-lash from the cooling coil represent a serious problem in the design of apparatus rooms. Experience has shown that the most effective way to eliminate carry-over and back-lash is to install the following:

1. Distributing plates over the inlet of both heating and cooling coils. The distributing plate is usually a perforated metal sheet with ½ inch round holes, having 40-50% free area. This plate should be amply reinforced, made removable and provided with access panels to coil chambers and sprays.
2. Corrosion resistant eliminator plates on the leaving side of the cooling coils. Three-bend eliminators spaced 1⅛ inch apart have been found to give good results for dual duct installations. If sprays are used in the warm chamber, eliminator plates should also be installed on the leaving side of the warm duct heating coil.

High Pressure Apparatus Casing

Utmost care should be exercised in the construction, bracing and sealing of the high pressure apparatus casing. For practical reasons, it is almost impossible to pressure test the casing chamber before the system is put in actual operation. Consequently, any error in construction, assembly and sealing is extremely difficult to correct after the system is completed.

It has been found practical and economical to mount all coils, sprays, eliminators, distributing plates and specialties in a factory fabricated casing designed for high pressure application, as indicated in Figs. 25 and 26. With a dehumidifier of this type, a tight enclosure will be assured around the vital parts of the system and service accessibility provided to all coils and sprays. The vertical split of cooling and heating chambers will be more desirable for the following reasons:

1. The heating chamber will be more accessible for inspection and repair.
2. Provisions for humidifying sprays are more easily made.
3. Floor area required for the apparatus will be saved if the pipe space for the cooling coils is utilized for the warm air chamber.
4. In many installations the connections to cold and warm mains are simpler.
5. Less air turbulence and casing vibration will be caused.

Insulation and Sound Lining

It is important that all sound lining installed inside casings be mechanically attached to the casing walls in addition to cementing. The metal clips and washers used for this purpose should not be spaced on more than 1 ft centers. All joints between insulation sheets should be filled with cement or protected by 1 inch x ⅛ inch flat bars to prevent air erosion. If lining is installed on the

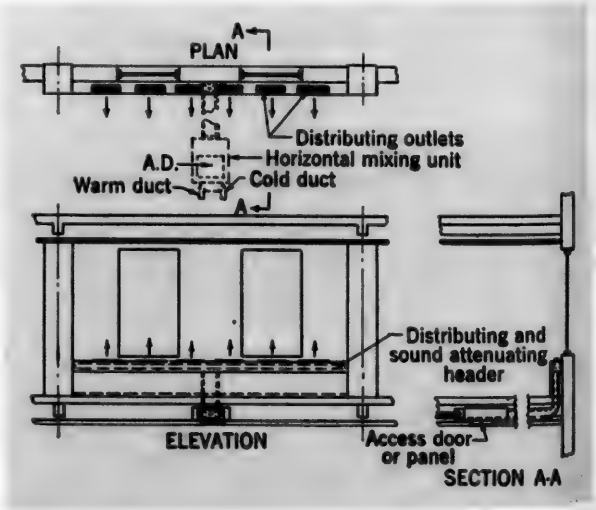


Fig. 24. Perimeter header fed by horizontal unit.

bottom of enclosures, it should be protected by heavy gage screen or perforated metal.

Fan and Motor Vibration Bases

Careful consideration should be given to the proper selection of fan and motor vibration absorbing bases. In addition to selecting the base for maximum efficiency, it should be adjustable—a feature which is usually incorporated in spring type bases. This feature might be very helpful in eliminating possible sympathetic vibration between the vibrating member and the building substructure.

Single Width vs Double Width Fans

A more compact arrangement of apparatus and quieter operation will be achieved by using DW fans, especially in larger plants. The chief reason for using SW fans is better mixture of outside and return air in the discharge of the fan. As explained in the Section on Dual Duct Cycles (Part 1 of article) partial stratification of air will not impair the operation of the system if the outdoor and return air connections are placed in proper relationship to the heating and cooling coils.

Supply Fans in Parallel

In larger air handling plants, such as shown in Fig. 26, it might be advisable to have two or more supply fans in parallel discharging air to a common plenum. When such an arrangement is used, the fans are equipped with normally closed inlet vanes operated by EP switches.

Noise Attenuation in the Air Handling System

Any air conditioning or air handling system is a potential source of noise which may enter the conditioned area through supply, return or exhaust ducts, by transmission through the building framework, or by communication from zone to zone through interconnecting ducts. The noise level of the supply duct increases with the system's pressure. This requires more efficient

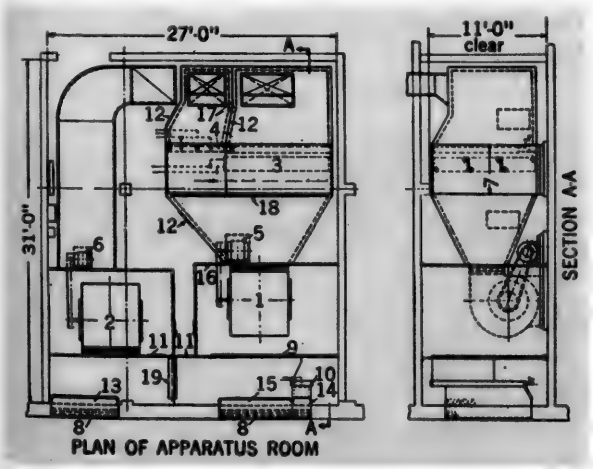


Fig. 25. Typical dual duct apparatus room of medium capacity.

1. Supply fan, total 50,000 cfm
2. Return and relief fans, total 40,000 cfm
3. Cooling coils, total 80 sq ft
4. Heating coils, total 45 sq ft
5. Supply fan motor
6. Return fan motor.
7. High pressure dehumidifier
8. Outdoor louvers and screens
9. Filters
10. Preheaters
11. Low pressure access doors
12. High pressure access doors
13. Relief dampers
14. Minimum O.A. damper
15. Maximum O.A. damper
16. One inch sound lining
17. Four-inch sound lining
18. Perforated distributing plate
19. Return air damper

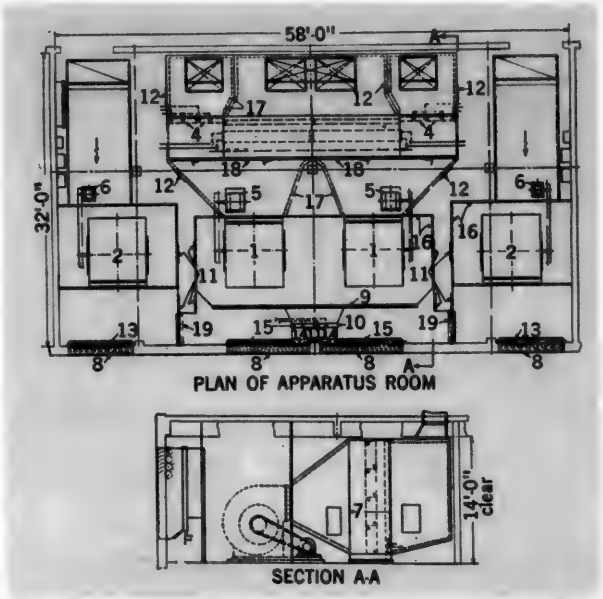


Fig. 26. Typical dual duct apparatus room of large capacity.

1. Supply fans, total 140,000 cfm
2. Return and relief fans, total 110,000 cfm
3. Cooling coils, total 230 sq ft
4. Heating coils, total 130 sq ft
5. Supply fan motors
6. Return fan motors
7. High pressure dehumidifier
8. Outdoor louvers and screens
9. Filters
10. Preheaters
11. Low pressure access doors
12. High pressure access doors
13. Relief dampers
14. Minimum O.A. dampers
15. Maximum O.A. dampers
16. One inch sound lining
17. Four-inch sound lining
18. Perforated distributing plate
19. Return air dampers

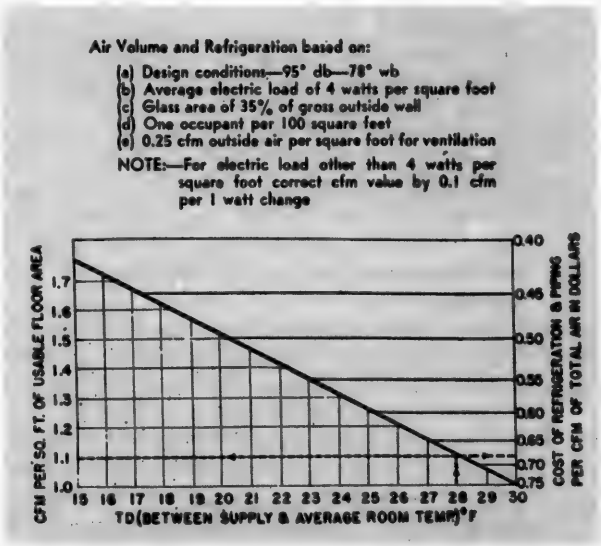

Air Volume and Refrigeration based on:
(a) Design conditions—95° db—78° wb
(b) Average electric load of 4 watts per square foot
(c) Glass area of 35% of gross outside wall
(d) One occupant per 100 square feet
(e) 0.25 cfm outside air per square foot for ventilation
NOTE:—For electric load other than 4 watts per square foot correct cfm value by 0.1 cfm per 1 watt change
CFM PER SQ. FT. OF USABLE FLOOR AREA
TD(BETWEEN SUPPLY & AVERAGE ROOM TEMP)°F
COST OF REFRIGERATION & PIPING PER CFM OF TOTAL AIR IN DOLLARS

Fig. 27. Total cfm per square foot of usable floor area and cost of refrigeration. Cost of refrigeration includes:

1. Compressor
2. Compressor motor
3. Condenser
4. Water cooler
5. Cooling tower
6. Cold water and condenser water pumps
7. Automatic controls
8. All inter-connecting piping
9. Insulation
10. Starters for all motors

acoustical treatment in the air distributing system than is required in low pressure systems. Experience indicates that the following provisions tend to attenuate system noise and to prevent regeneration of noise in the air handling system.

1. Internal lining for apparatus chambers as shown on Figs. 24 and 25.
2. Internal lining for cold, warm and return ducts

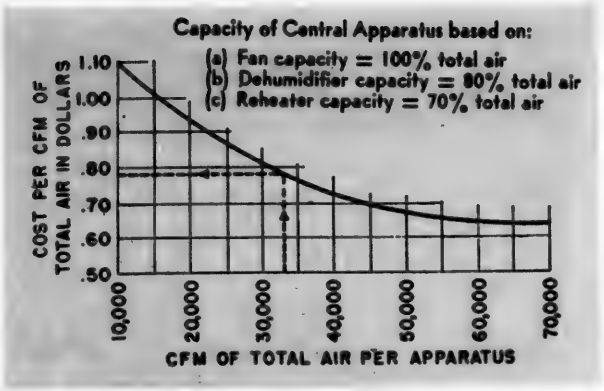


Fig. 28. Cost of central apparatus. Cost of central apparatus includes:

1. Class II supply fan
2. Class I return air fan
3. Fan motors
4. Motor starters
5. Variable pitch drives
6. Vibration absorbing bases
7. High pressure dehumidifier
8. 8-row cooling coil
9. 2-row heating coil
10. 1-row preheat coil
11. Spray pumps and piping
12. Apparatus casing
13. Simple filters
14. Automatic control
15. Specialties, doors, etc.

leaving apparatus room for a distance of 20 to 30 ft.

3. Internal lining for low pressure ducts leaving the mixing units. Where lining is used in ducts or casings, the external insulation could be omitted.
4. Whenever possible, the cold and warm apparatus chambers should be split vertically. Possibility of air turbulence and casing vibration during partial load operation will be avoided with vertical split. If horizontal split of chambers is used, it is recommended to separate all ducts from the apparatus casings by flexible joints.
5. No sharp metal edges should be allowed to extend into the air stream of high velocity ducts. Air inlet collars on mixing units must conform to and be flush with the flexible tubing or other inlet connections. If these provisions are not made, a loud hiss or whistle can be generated at high velocities.
6. All duct joints must be properly made and sealed. When a joint is inaccessible for sealing from the outside, a hand hole should be cut in the duct and the joint sealed from the inside.
7. All rectangular high pressure elbows and sharp offsets should be vaned. If duct velocity is over 2500 fpm, vanes should be of streamlined construction. Vanes should be securely attached to the duct or mounting frame to prevent rattling. Only long sweep elbows should be used with round ducts. Tape never should be used to seal the joints of rectangular ducts.
8. Tap-offs should never be located on the elbows or other points of the system where air velocity is not uniform.
9. All apparatus walls and doors should be soundproofed if the apparatus room is located adjacent to the conditioned areas.
10. Quality of workmanship in sheet metal trades and the experience of the installer constitutes an important factor in producing a quiet and tight duct system.

The specially designed sound traps in the duct mains are desirable but their effectiveness too often is nullified by noise regeneration in the duct system. It must be recognized that in a high velocity system, the natural attenuation of the duct system is at best an unknown quantity. It is always safer to assume possibility of some degree of noise regeneration in the ductwork. To achieve a quiet system, the designer should rely primarily on sound attenuating provisions in the mixing units and on lined low pressure ductwork on the leaving side of the mixing units.

BUDGET COSTS FOR DUAL DUCT SYSTEMS

Cost data presented here are offered for the use of the design engineer in a form that will allow him to establish budget information quickly, without making detailed estimates and partial plans which must be discarded and replaced before final figures are produced. These figures also show the areas in which savings may be found to reduce costs to meet predetermined budget allowances.

All cost data is based on the net, or usable area of the building. The non-usable areas, stairwells, elevators, toilets, main corridors, etc. have little or no effect on the air conditioning cost unless these spaces contribute to the complexity of the distributing system.

Data given were compiled from detailed cost analyses of various high pressure dual duct systems with total refrigeration capacity of over 20,000 tons, ranging in size from 75 to 2,000 tons each. Special effort has been made to arrange the information so the design engineer has a tool to guide his planning. Dual duct systems have great flexibility in performance, but the degree of flexibility and the selected range of operation affect the cost, just as curtailed cost allowances limit the degree of selectivity and economy of operational objectives.

Variables Affecting Costs

In the design of dual duct systems, many variables directly affect the cost of a system. By ignoring minor details as having very small effect on the total, all major factors may be grouped and combined into four basic items.

1. TD (Room temp. — cold air supply temp.)

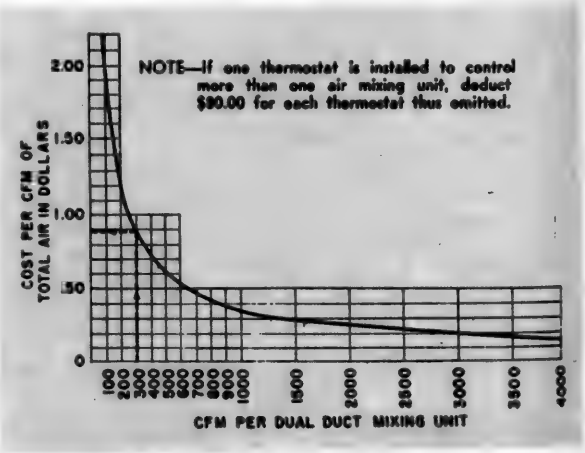
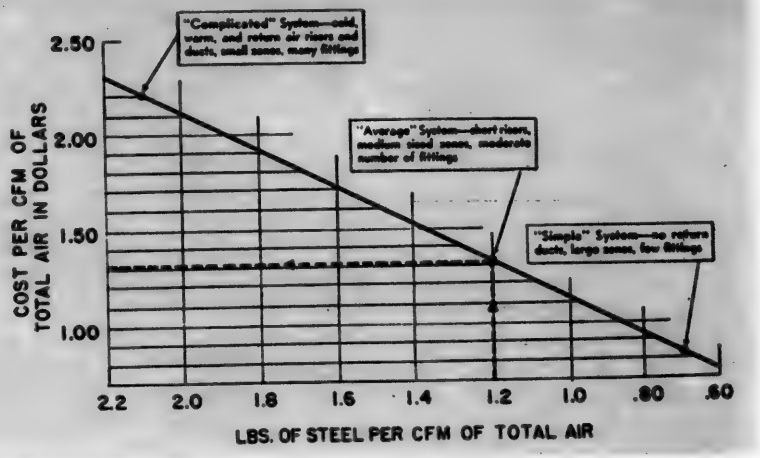


Fig. 29. Cost of zoning. Cost of zoning includes:

1. Air mixing unit
2. Thermostat installed
3. Duct connection to high pressure mains
4. Two tap-offs on high pressure mains
5. Insulation of cold flexible duct

Fig. 30: Cost of general distributing duct system. This cost includes:

1. Sheet metal mains and risers
2. Insulation of cold air ducts and risers
3. Metal and lining of low pressure duct work
4. Air outlets and grilles
5. Miscellaneous vanes, caulking compounds, fire dampers, etc.



2. Size of central apparatus (capacity of supply fan)
3. Average size of control zones (capacity of mixing units)
4. Complexity of distributing duct system

Table 3 shows the effect on the cost of the installation of the last two variables. The cost of refrigeration and central apparatus is assumed to be constant, as stated in the typical example. The range of costs shown in the table is common and might be extended upward or downward by special factors peculiar to a particular project, or by the effect of the first two variables.

Cost analysis as shown in Figs. 27, 28, 29 and 30 and in Table 3 applies to an average multi-story office building of standard construction and normal shape. Wage rates prevailing in northeastern states in 1956 were used in calculating total erection costs. The central apparatus and distributing system were assumed to be in accordance with good engineering practice. Buildings with architectural and structural designs deviating from normal will introduce some degree of error in costs shown on curves, but these curves will still be useful to indicate cost tendencies and are valuable in developing basic schemes for any project.

All data pertaining to the cost of dual duct systems are combined in the four curves of Figs. 27, 28, 29 and 30. The costs are given per cfm of total supply air. This may not be as graphic as the customarily used units, cost per square foot of floor area, or cost per ton of refrigeration, but it is more indicative of the true cost of the system.

Figure 27 shows the relationship between TD and cfm per sq ft of usable floor area. A decrease from 30 to 20 deg TD represents a 50% increase in size of the air distributing system. After considering the variables represented in Figs. 28, 29 and 30, the saving due to higher TD is obvious. Any extra cost of outlets, insulation or other minor factors associated with higher TD, is a negligible fraction of the savings obtained by reduction in capacity of the air handling system. This statement applies to both first cost and annual owning and operating costs. High TDs can be safely used if the air is distributed by suitably designed outlets with high induction ratio. The effect of TD on cost is not shown directly in Fig. 27, but is reflected by Figs. 28, 29 and 30.

The cost of refrigeration is shown on the right vertical scale of Fig. 27. The refrigeration is calculated for average conditions:

1. One ton per 330 sq ft of net conditioned area; this is average for office buildings having 35% of glass in the outside walls, with outside ventilating air of 0.25 cfm per square foot and outside design conditions of 95 deg dry bulb, 78 deg wet bulb.
2. The cost of refrigeration and piping has been assumed as $250 per ton.

The cost of refrigeration includes the refrigeration cycle, cooling tower, water cooler, condensate water and cold water circulating pumps, interconnecting piping, motors and starters. It is assumed that cooling tower, condenser, water cooler and dehumidifier are reasonably close to each other. If refrigeration apparatus is remote from either, or both, cooling tower or chilled water coils, an additional allowance must be made for extra piping.

Figure 28 shows the cost of central apparatus, in terms of its size, for the conditions listed. Special features, such as more expensive filters, should be added to this cost. Costs of sheet metal casings and internal lining included in the curve represent a carefully planned apparatus room, using not over 2% of the total conditioned area, and having approximately 0.2 lb of sheet metal casings per cfm of total air.

Figure 29 indicates the cost of zoning expressed in

TABLE 3—RANGE OF COSTS OF HIGH PRESSURE DUAL DUCT SYSTEMS INCLUDING REFRIGERATION AND PIPING

Size of Average Zone, CFM	Complicated Layout		Average Layout		Simple Layout	
	Cost per Sq Ft of Net Area	Cost per Ton	Cost per Sq Ft of Net Area	Cost per Ton	Cost per Sq Ft of Net Area	Cost per Ton
300	$5.00	$1670	$4.04	$1336	$3.48	$1160
500	4.70	1570	3.71	1240	3.17	1060
1000	4.44	1480	3.45	1150	2.90	970
4000	4.20	1400	3.23	1080	2.67	890

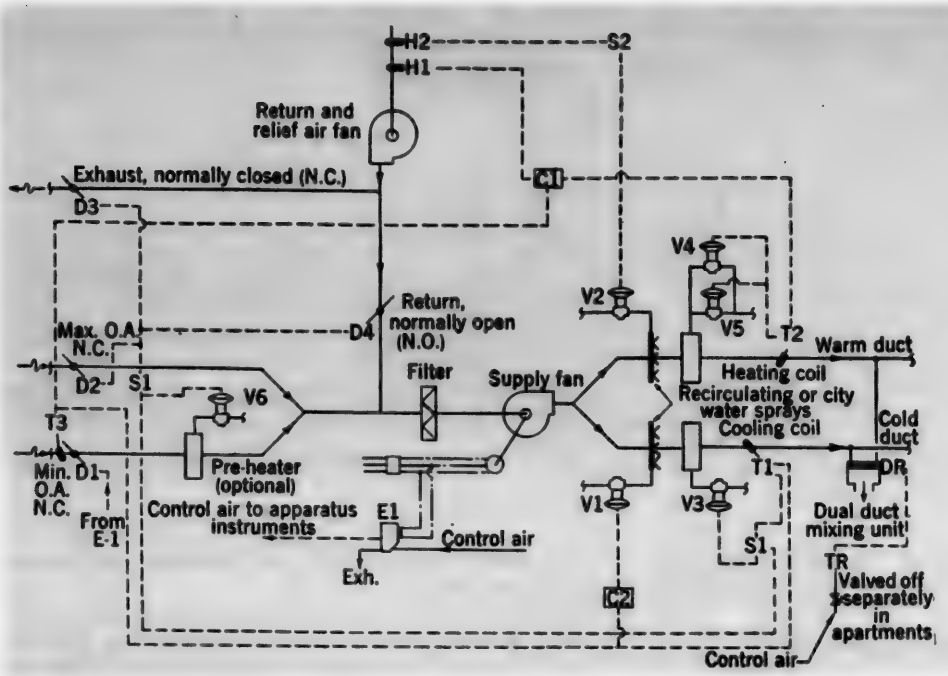


Fig. 31. Typical automatic control diagram for dual duct system.

terms of cfm required by the average zone, or the average capacity of the mixing unit. The relatively high costs of smaller zones are clearly demonstrated, and such zones should be used only when required by design conditions.

Figure 30 shows the cost of the distribution system. It is difficult to find a definite unit which reflects the combined cost of the distributing system, especially in the preliminary stages of design. Analysis shows that two criteria may be used to establish the cost of the distributing system.

1. The weight of steel per cfm of total air handled.
2. The complexity of the layout which may be classified as complicated, average, or simple.

By applying either of these criteria, a suitable point on the horizontal scale of Fig. 30 can be selected and the cost predicted with reasonable accuracy. Some familiarity with the art of dual duct system design is necessary for proper use of this graph, if attempt is made to apply the curve without making preliminary duct layout.

Point 1, the weight of sheet metal per cfm, is an accurate indication of the cost, providing proper allowance is made for the way the duct is designed and constructed and its average size. The cost of duct fittings is three to four times that of straight duct of the same weight and size. A given run of ductwork containing a large number of fittings and transformations, may cost 50-75% more than a similar run of well designed duct with standardized sizes and a limited number of fittings.

Examples Illustrating Use of Cost Curves

A multi-story office building of average shape and with average design conditions, having 90,000 sq ft of net usable area and 120,000 sq ft gross area, is to be conditioned by a high pressure dual duct system. It is decided that the system will have three central fan units and 330 zones. What is required is the budget cost of the installation.

Step No. 1. Assume a TD (temperature difference) of 28 deg. From Fig. 27, 28 deg TD requires 1.1 cfm per square foot as shown on the vertical scale at left. Total volume of air to be distributed = 90,000 sq ft × 1.1 cfm per sq ft = 99,000 cfm. Cost of refrigeration and piping per cfm is 68c, as given on the vertical scale at right. Total cost for both the refrigeration and piping: 99,000 cfm × $0.68 per cfm = $67,320.00
Total refrigeration: 90,000 sq ft ÷ 330 = 272 tons for average loading intensity of 330 sq ft per ton refrigeration

Step No. 2. Each central fan system will distribute 99,000 cfm / 3 = 33,000 cfm. Figure 28 shows the cost of central apparatus per cfm as 78c. Total cost of apparatus: 99,000 cfm × $0.78 per cfm = $77,220.00

Step No. 3. Each average zone will require 99,000 cfm / 330 = 300 cfm. Cost of zoning per cfm, as shown in Fig. 29 is 89c. Total cost of zoning: 99,000 cfm × $0.89 per cfm = $87,110.00

Step No. 4. From consideration of a tentative scheme, it is decided that the distributing system will be average in complexity. Figure 30 shows cost of average air distribution system to be $1.32 per cfm.

Total cost of distributing system: 99,000 cfm × $1.32 per cfm = $130,680.00

Total cost of system to contractor: $362,330.00

Cost per cfm = $363,330 / 99,000 cfm = $3.67

Cost per ton = $363,330 / 272 tons = $1,336.00

Cost per sq ft (usable area) = $363,330 / 90,000 sq ft = $4.04

Cost per sq ft (gross area) = $363,330 ÷ 120,000 sq ft = $3.03

These costs do not include:

1. Power wiring

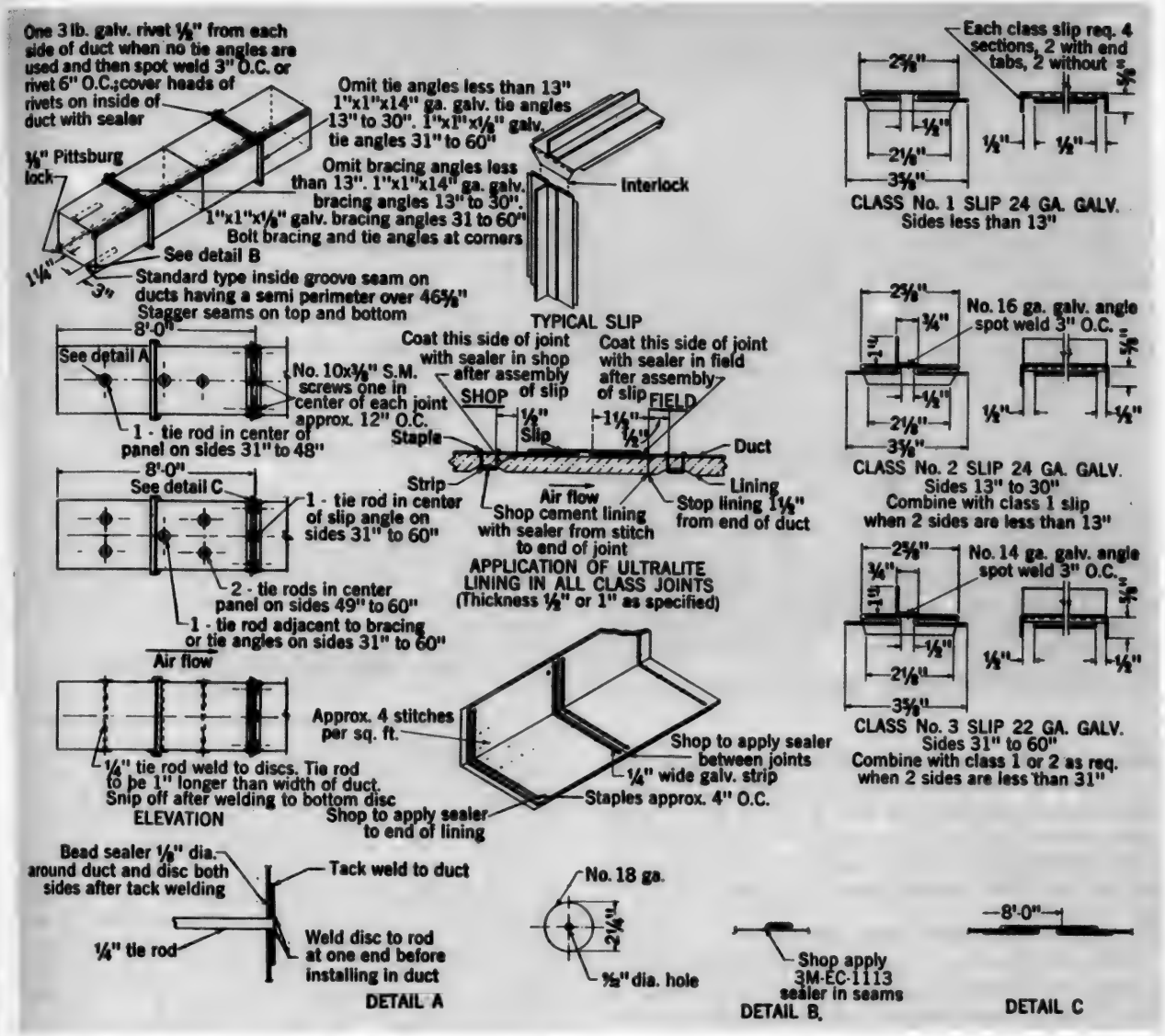

One 3 lb. galv. rivet 1⅛" from each side of duct when no tie angles are used and then spot weld 3" O.C. or rivet 6" O.C.; cover heads of rivets on inside of duct with sealer
⅜" Pittsburg lock
1¼"
3"
See detail B
Standard type inside groove seam on ducts having a semi perimeter over 46⅝"
Stagger seams on top and bottom
Omit tie angles less than 13" 1"x1"x14" ga. galv. tie angles 13" to 30". 1"x1"x⅛" galv. tie angles 31" to 60"
Omit bracing angles less than 13". 1"x1"x14" ga. galv. bracing angles 13" to 30". 1"x1"x⅛" galv. bracing angles 31 to 60"
Bolt bracing and tie angles at corners
Interlock
TYPICAL SLIP
8'-0"
See detail A
No. 10x⅜" S.M. screws one in center of each joint approx. 12" O.C.
1 - tie rod in center of panel on sides 31" to 48"
8'-0"
See detail C
1 - tie rod in center of slip angle on sides 31" to 60"
2 - tie rods in center panel on sides 49" to 60"
1 - tie rod adjacent to bracing or tie angles on sides 31" to 60"
Air flow
¼" tie rod weld to discs. Tie rod to be 1" longer than width of duct. Snip off after welding to bottom disc
ELEVATION
Coat this side of joint with sealer in shop after assembly of slip
Coat this side of joint with sealer in field after assembly of slip
SHOP
FIELD
⅛" Slip
1½"
½"
Staple
Duct
Strip
Lining
Air flow
Shop cement lining with sealer from stitch to end of joint
Stop lining 1½" from end of duct
APPLICATION OF ULTRALITE LINING IN ALL CLASS JOINTS
(Thickness ½" or 1" as specified)
Approx. 4 stitches per sq. ft.
Shop to apply sealer between joints
¼" wide galv. strip
Staples approx. 4" O.C.
Shop to apply sealer to end of lining
Bead sealer ⅛" dia. around duct and disc both sides after tack welding
Tack weld to duct
¼" tie rod
Weld disc to rod at one end before installing in duct
DETAIL A
No. 18 ga.
2¼"
½" dia. hole
Shop apply 3M-EC-1113 sealer in seams
DETAIL B
8'-0"
DETAIL C
Each class slip req. 4 sections, 2 with end tabs, 2 without
2⅝"
1½"
2⅛"
3⅝"
½"
½"
CLASS No. 1 SLIP 24 GA. GALV.
Sides less than 13"
No. 16 ga. galv. angle spot weld 3" O.C.
¾"
1½"
CLASS No. 2 SLIP 24 GA. GALV.
Sides 13" to 30"
Combine with class 1 slip when 2 sides are less than 13"
No. 14 ga. galv. angle spot weld 3" O.C.
CLASS No. 3 SLIP 22 GA. GALV.
Sides 31" to 60"
Combine with class 1 or 2 as req. when 2 sides are less than 31"

Fig. 32. Construction of high pressure rectangular ducts.

2. Building construction work, painting, etc.
3. Miscellaneous exhaust and special systems
4. Boilers and steam piping outside of apparatus rooms

To establish the cost to the owner, an allowance for engineer's fees and contractor's overhead and profit must be added to the previous costs.

AUTOMATIC CONTROL FOR DUAL DUCT SYSTEMS

Basic function of automatic controls for dual duct cycle of Figs. 1 and 2 is shown on Fig. 31. The system is assumed to provide for humidity control in winter time and a preheat coil in the minimum outdoor air duct. Minor modifications in control arrangement would be required for cycles of Figs. 3, 4 and 5 (Part 1).

When the supply fan is started, relay E-1, actuated by the fan motor starter, supplies compressed air to all apparatus and room control instruments. Minimum outdoor damper D-1 opens when the supply fan runs. Damper D-1 could be arranged to be closed manually or automatically when ventilation is not required, as for night operation, warm-up, or cool-down periods. Summer-winter switches S-1 and S-2 can be manual or automatic.

Summer Operation

With summer-winter switch S-1 in summer position, cold duct thermostat T-1 controls chilled water valve V-3 to maintain desired temperature in the cold deck. The practice of eliminating chilled water control valves or controlling only water temperature leaving the coil is not recommended because of danger of having excessively low temperatures in the cold duct on partial loads.

Sub-master warm duct thermostat T-2 is reset through cumulator C-1 by summer humidistat H-1 and controls steam or hot water valves V-4 and V-5. Minimum setting of thermostat T-2 should be approximately 5 deg above average room temperature and maximum setting equal to the temperature required for maximum heating load. In order to avoid hunting of warm duct control at low loads, it is recommended to provide two valves, V-4 and V-5, in parallel approximately of ⅓ and ⅔

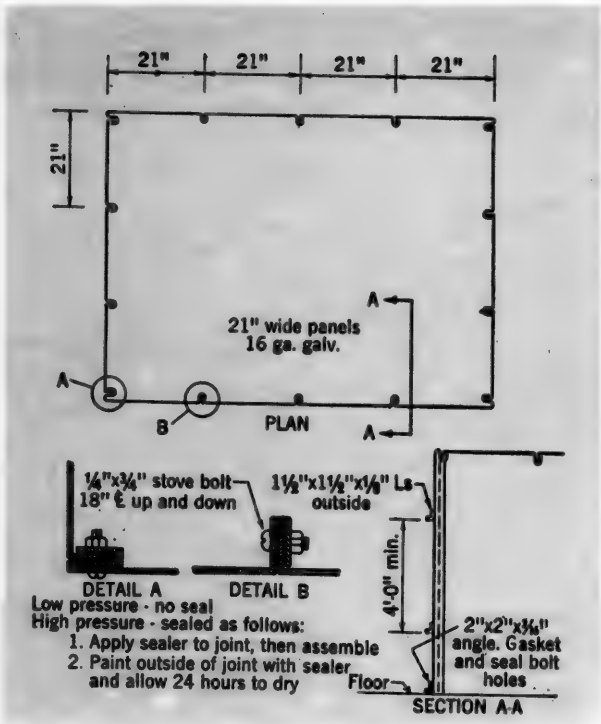


Fig. 33. High pressure casing construction.

capacity respectively. Summer humidistat H-1 adds heat to the warm duct only when low internal loads occur during humid weather (see Figs. 8, 9 and 10). During high summer load operation, control of temperature in warm duct is not essential and source of heat might be shut off or the controls made inoperative.

Winter and Intermediate Season Operation

When refrigeration is not required, the summer-winter switch S-1 is placed in winter position allowing thermostat T-1 to modulate dampers D-2, D-3 and D-4 to maintain cold duct temperature by drawing cool air from outdoors. For economy, to minimize the amount of reheat in the warm duct, city water sprays or recirculating pump sprays could be put into operation ahead of dampers D-2, D-3 and D-4 through relay C-2. Evaporative cooling of 8 to 12 deg could be achieved. Contamination of air in industrial cities makes use of recirculating sprays inadvisable for prolonged use. Hand-off-automatic switch, if recirculating pump is used, should be provided to stop sprays during very cold weather. In order to reduce the amount of outdoor air heated during cold weather, thermostat T-1 is usually reset upward in winter, for operating economy. Experience indicates proper winter setting of thermostat T-1 can be determined only by actual operation of the particular system.

Warm duct temperature is controlled by submaster thermostat T-2 as reset by master thermostat T-3. Humidity control can be accomplished by winter humidistat H-2 controlling city water spray valve V-2 or a recirculating spray pump. When preheater in minimum outdoor air is used, it is controlled by thermostat T-1 to maintain minimum temperature of the air drawn into the system.

On new buildings, where temporary heat is to be provided by a dual duct system, room thermostats T-R should be direct acting with warm air connections in room mixing units normally open. If cold connections in the mixing units are normally open, room thermostats should be reverse acting.

DUAL DUCT CONSTRUCTION AND SPECIFICATIONS

On many multi-zone installations due to space limitations, rectangular ducts must be used to make installation feasible. At present the high pressure construction for rectangular ducts is not yet fully standardized and several types of duct construction have been developed to conform to local practices. The construction shown in Fig. 32 and Table 4 has been used successfully in a great many high pressure installations and will give good results if care is exercised in the field to seal joints properly. Several types of sealing compounds have been developed for making up the joints in high pressure ductwork. They all have a synthetic rubber base with a bonding strength that does not decrease with age and retains good elasticity.

Sealing Duct Joints

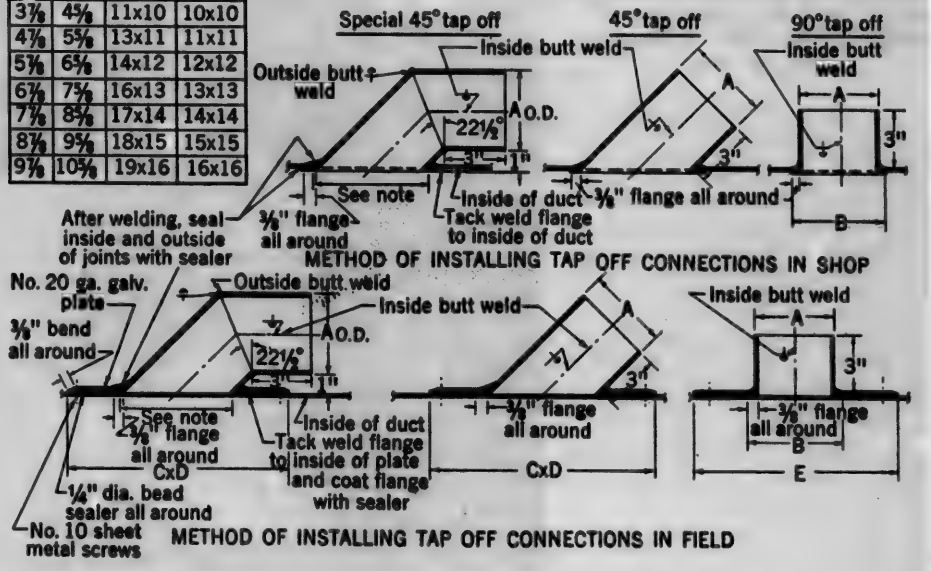
The shop procedure for sealing high pressure ducts is as follows:

TABLE 4—GAGES AND REINFORCING FOR RECTANGULAR HIGH PRESSURE DUCT

Duct Size, Inches	Gage	Joint Length, Feet	Slip Class	Tie Rod Reinforcing	Bracing Angle (Top and Bottom)	Tie Angles (Sides)
1-12	24	8	1	None	None	None
13-25	24	8	2	None	1" x 1" x 14 Ga. ⌊ 2 per Joint	1" x 1" x 14 Ga. ⌊ 2 per Joint
26-30	22	8	2	None	Ditto	Ditto
31-45	22	8	3	4—¼" Rods	1" x 1" x ⅛" ⌊ 2 per Joint	1" x 1" x ⅛" ⌊ 2 per Joint
46-48	20	8	3	Ditto	Ditto	Ditto
49-60	20	8	3	6—¼" Rods	Ditto	Ditto

Fig. 34. Details of tap-off fittings for high pressure ductwork.

A O.D.	B O.D.	CxD	E
	Inches		
3⅞	4⅝	11x10	10x10
4⅞	5⅝	13x11	11x11
5⅞	6⅝	14x12	12x12
6⅞	7⅝	16x13	13x13
7⅞	8⅝	17x14	14x14
8⅞	9⅝	18x15	15x15
9⅞	10⅝	19x16	16x16



Note:
Cut opening in duct ¼" larger than tap off

All tap off connections to be No. 22 ga.

1. Before fittings and joints are assembled, sealer shall be applied to rivets, grooved seams, and tap-off collars on the internal side of the metal. Pittsburgh lock pocket must be flooded with sealer, and the duct assembled.
2. Sealer shall be brushed around reinforcing rod washers, corners, rivets, notches and tap-off collars after ducts are assembled. A double S-slip shall be installed on the air-leaving-side of the duct and fastened in place, using metal screws on 6-inch centers. Sealer shall be brushed into connecting lap and corner joints of an S-slip.
3. Coat inside of connecting lap of S-slip and duct surface with sealer. Where possible, sealing should be done on inside of the ductwork.

Field Procedure

The field procedure for sealing duct joints is as follows:

1. Sealer shall be spread on the inside of the double S-slip and the joints of the duct assembled. Immediately after joints are assembled, holes are drilled through the S-slip and metal screws inserted on 6-inch centers. Sealer should be applied over the screw heads and the joint.
2. After 24 hours, a second coat of sealer is spread over the joints and allowed to dry for 24 hours before testing.
3. Where joints are not accessible for proper sealing, hand holes should be cut in the duct and the joints sealed from the inside. Special care should be taken to seal all duct corners.
4. When testing ducts for leaks, leaks should be marked and resealed without pressure in the duct and allowed to dry for 24 hours.

The construction for high pressure apparatus casings with sealed joints is shown in Fig. 33.

All high pressure apparatus casings shall be constructed of 16 gage galvanized metal panels. Maximum width of panel shall be 21 inches. One side of a panel shall be flanged 1 inch and the opposite side formed with 1 inch double standing seam.

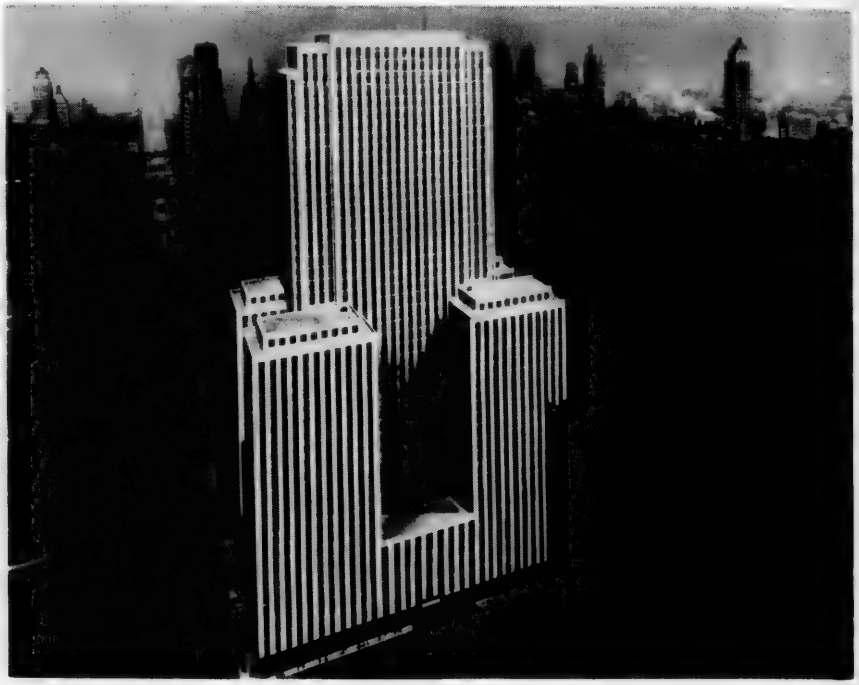
Panels shall be assembled interlocking the flanged side with the double standing seam and bolting on 18-inch centers. All seams shall project into the air side of the apparatus casings. Sealer shall be applied into double standing seam prior to assembly. Joint should be assembled immediately after sealer is applied. Paint outside of seam with sealer and allow 24 hours to dry.

Panels shall be braced rigidly in place by 1½-inch x 1½-inch x ⅛-inch angles spaced on 4 ft centers maximum, and run continuously for the full length or width of the casings.

Casings

Casings shall be secured to floors or walls by a 2-inch x 2-inch x ⅛-inch toe angle and grouted between the toe angle and the floor. The toe angle shall be secured to the floor or wall by ¼ inch bolts at 1 ft centers, shot into the floor or the wall or by ¼ inch J-bolts set in concrete on 1 ft centers. The casing shall be secured to the toe angle by bolting through the flange angles of the panels at 1 ft centers. The toe angles shall run continuously for the full length of the casing in contact with the floor or wall. It is important to seal all joints airtight with sealer.

Rivets and bolts through the casing shall be sealed airtight by covering the heads on the inside with sealer.



Field Building, Chicago, Ill. — Existing building fully conditioned above fifth floor by high pressure dual duct system supplemented by original radiation system under the windows. The Field Foundation, Inc., owners.

The tap-off fittings commonly used for connecting flexible tubing to high pressure ductwork are shown on Fig. 34. When high pressure ductwork is pressure tested for tightness the tap-offs are closed with ordinary paper shopping bags held in place by scotch tape. The special 45 deg fitting if installed on bottom of the duct perpendicular to the air flow is equivalent to two elbows and will save appreciable headroom and space under the ductwork. The raw edge of the hole cut in the duct should never be in the path of high velocity air and the tap-offs should be installed as shown in Fig. 34.

Added Credit

On page 85, April, 1958 issue of this magazine, there is a photograph of buildings of Rockefeller Center. The caption should have read, "Existing buildings of Rockefeller Center having 1,000,000 sq. ft. conditioned by high pressure dual duct systems, supplemented by present direct radiation. Engineers Rockefeller Center, Inc."

Heat Exchanger Prevents Ice Damage to Piers

Two research engineers of the Illinois Institute of Technology, Armour Research Foundation, have come up with a device that could save millions of dollars annually by preventing ice damage to piers, docks, and boats during winter months.

They have developed a heat exchanger which this past winter has completely eliminated ice from an area around a large pier installation at Lake Geneva, Wis.

The engineers are George E. Gross, administrative supervisor, and William F. Cramer, Jr., senior engineer.

Using the principles of heat exchange and the upsetting of stratification of water required for freezing, the unit they have developed is inexpensive, portable, and can't be damaged in normal use. An added feature is the ability to regulate the direction of the unit's effectiveness to melt almost any pattern in the ice needed or desired. The cost of the initial installation would vary with the type of protection needed and the size and location of the pier.

A unit similar to the one built for the Lake Geneva pier would cost about $500 initially, and $16 a year to operate. In most cases, the initial cost would be far less, and maintenance costs would be low.

To remove and re-install the pier at Lake Geneva in the usual manner each fall and spring would cost approximately $1,200 a year.

The 70-pound pilot unit was put in operation under a pier belonging to Herbert Johnson, 8333 Niles Center Rd., Skokie, Ill., a contractor who plans to make the units available commercially. The 62-foot long and 12-foot wide pier is located in a corner of Button's Bay in Lake Geneva. Gross and Cramer checked the operation of the unit every Saturday since ice formed on the lake.

They found that the water surrounding the pier maintained a temperature of 35 degrees, even through the coldest weather which reached 20 deg. below zero. At no time were the pier's posts in danger, Gross said.

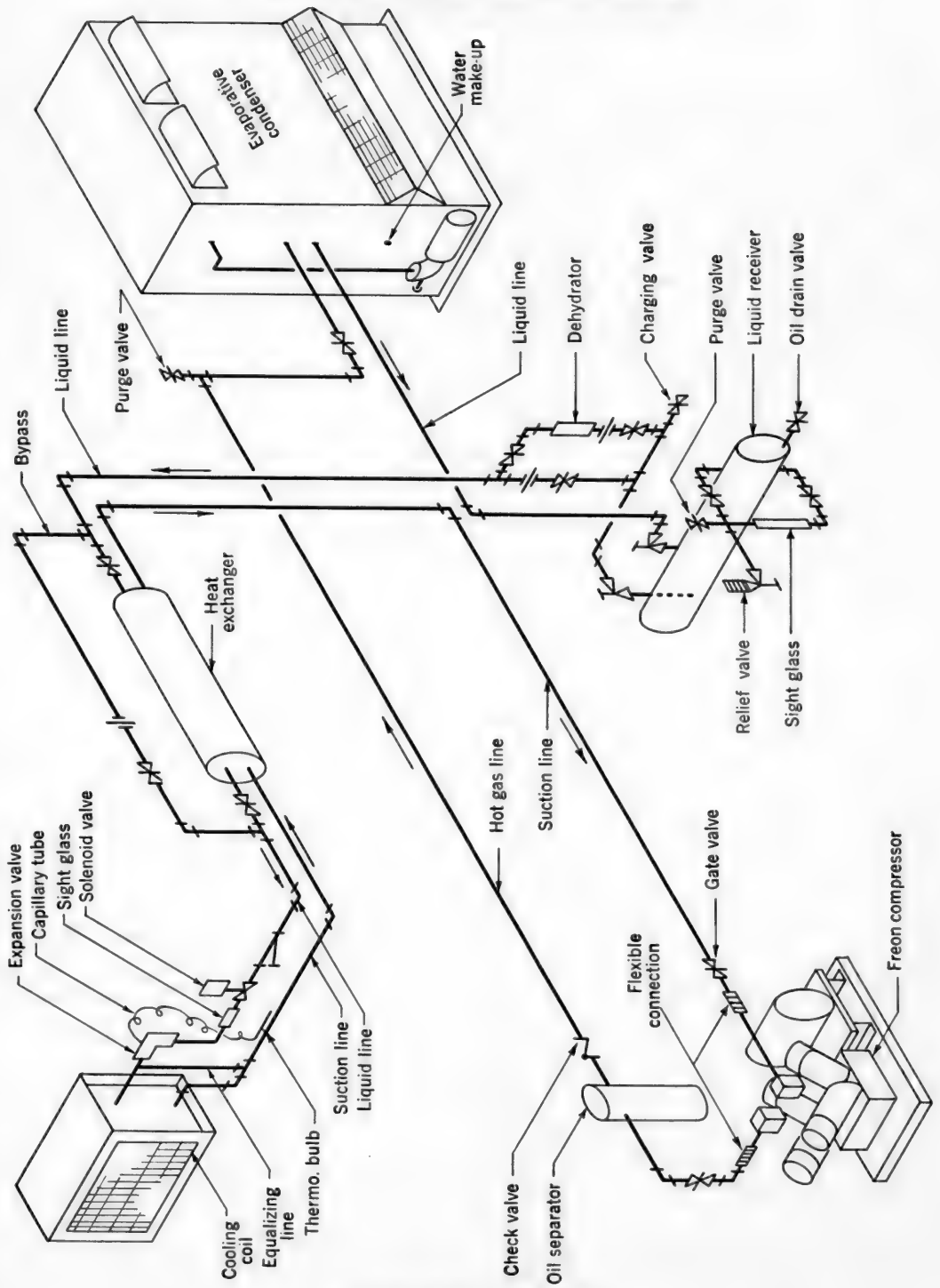
With a slight adjustment, they could raise the temperature to 37 degrees, and they believe it is possible to approach 40 degrees at this location.

At 35 degrees, the unit was operating at only 38 percent efficiency. At this rate, they estimated the device compensated for the freezing of roughly 30,000 pounds of ice in 10 hours.

Nature provides an added advantage to the unit, Gross said. Because the water around the pier is darker than the surrounding ice, it absorbs light, causing the heated area to warm itself naturally.

Gross pointed out that future research on the heat exchanger has many possibilities. Experiments indicate that a similar device would be feasible for keeping Great Lakes locks open the year round.

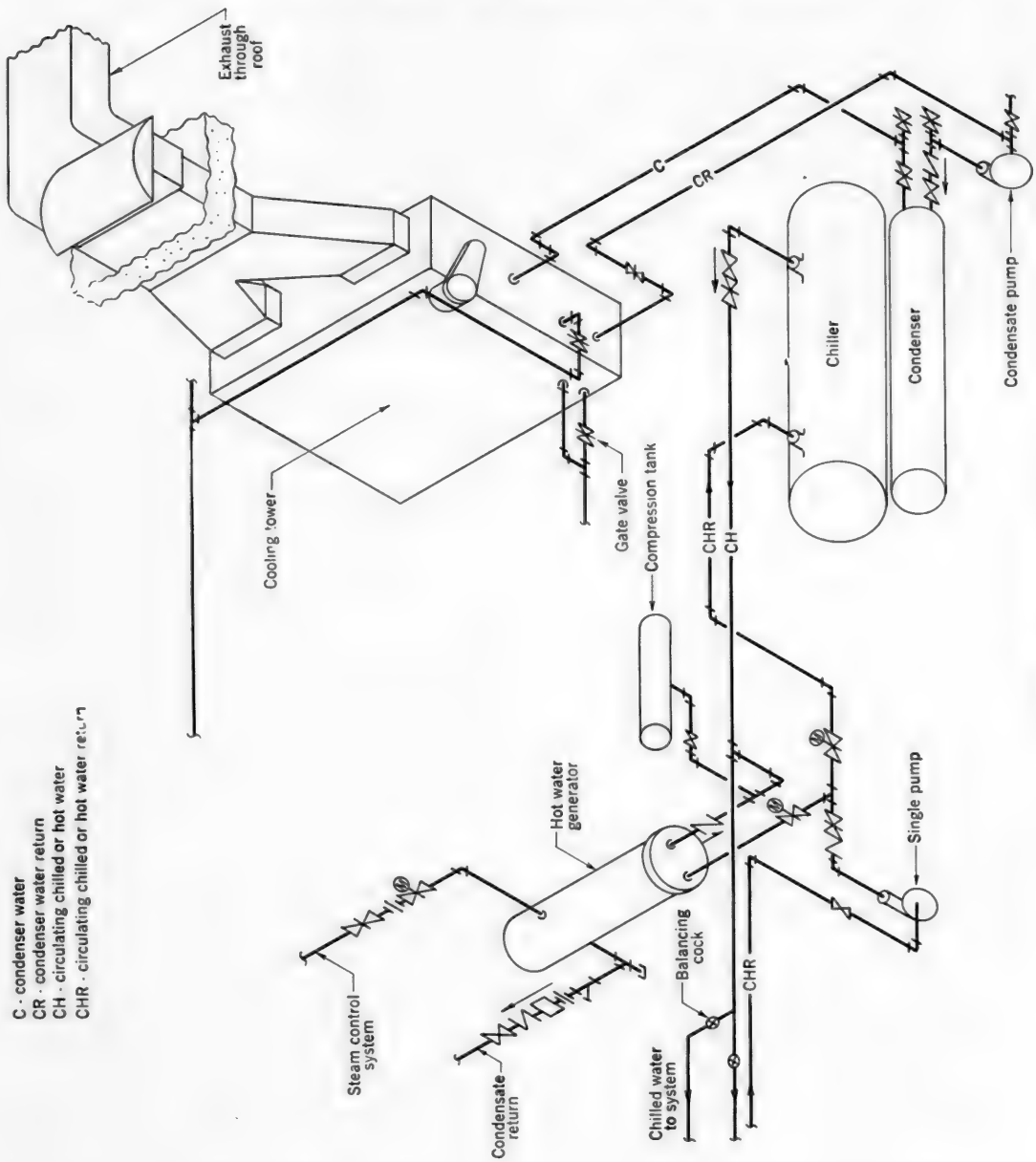
REFRIGERATION HOOK-UP FOR AIR CONDITIONING



Drawing courtesy of C. N. Bush
Fay, Spofford & Thorndike, Boston, Mass.

CHILLED AND HOT WATER SYSTEM

FOR COMMERCIAL AND INDUSTRIAL BUILDINGS



Drawing courtesy of Harlan Grim
Hayes, Seay, Mattern & Mattern, Norfolk, Va.

In a detail sheet on page 99 of the February, 1958 issue, a piping diagram is shown for a dual temperature service hot water system. Mention should have been made that this booster recovery installation is covered by U. S. Patent No. 2,291,023 owned by A. O. Smith Corp., Milwaukee, Wis.

Heating and Ventilating System Design for Hospitals

J. E. YORK
Consulting Engineer, Harwich, Mass.

Part 2 of a two-part article covering the design of heating and ventilating systems for hospitals. Engineers will find considerable helpful information and guidance in this article which is continued from the previous issue.

A SEPARATE vacuum pump for each zone is preferable, but a single unit as shown in Fig. 6, properly sized and located, may be used for as many as three zones. Where a vacuum pump serves more than one zone, it must be controlled from the zone which is expected to require the highest vacuum.

Vacuum Pumps

Vacuum pumps should preferably be provided with independently operated condensate and air removal pumps. The condensate pumps should be sized on the basis of the total square feet EDR including any bare steam piping. The load due to bare piping may be computed at 300 Btu per square foot of actual pipe surface.

Under normal operating conditions, the condensing rate of a heating system is approximately 0.5 gpm per 1000 sq ft EDR. If a single pump is provided having a capacity of 1.0 to 1.5 gpm capacity per 1000 sq ft EDR, it will have ample capacity for intermittent operation at normal full load or for continuous operation during start-up periods which are infrequent in a hospital. If a duplex pump unit is provided, the capacity of each pump need not exceed 1 gpm per 1000 sq ft EDR.

The air pump for a single vacuum pump unit on a system operating at 10 inches Hg vacuum, should have a capacity of 1.00 cfm per 1000 sq ft EDR. If a duplex pump is provided, the capacity of each pump may be reduced to 0.75 cfm per 1000 sq ft EDR.

Where a single air pump is provided on a system operating at 20 inches Hg vacuum, the capacity of the pump should be 2.0 cfm per 1000 sq ft EDR. For a unit with two pumps, the capacity per pump may be reduced to 1.5 cfm per 100 sq ft EDR.

The vacuum pumps should be located where they can be readily inspected and serviced, but where they cannot be tampered with by unauthorized personnel.

It is advantageous, from this standpoint, to locate these pumps in the mechanical equipment room near the distribution center. Because of the difficulty of providing the necessary pitch with the long return lines required if the pumps are so located, it may be advisable to provide separate locations nearer the load center for each zone. Provision should be made for adequate ventilation to remove excess heat from these locations. Where long return lines are required, the use of lift fittings may be necessary, but they should be avoided, if possible.

Drips from systems operating at higher pressures should discharge to a separate condensate pump with a vented receiver unless they can be flashed to a suitable year-round low pressure system, and the drips from the flash tank pre-cooled before discharging to the vacuum return system. This is necessary to prevent re-evaporation of warm condensate at the vacuum conditions prevailing in the low pressure returns, with consequent over-loading of the vacuum pumps.

Control Equipment

For each zone, a suitable device is installed on the inside glass surface of a selected window or transom. This device is only slightly affected by room temperature, but primarily by the varying weather conditions. This device, and a second device, which may be a suitably located thermostat or a specially constructed convector which reflects inside conditions, are connected through a control panel located in the mechanical equipment room to the control valve, to regulate the admission of steam into the zone heating system, as required.

A variable vacuum controller, as shown in Fig. 7, which on one side preferably is connected near the end of the steam main and on the other to the return main, controls the operation of the vacuum pump to maintain the re-

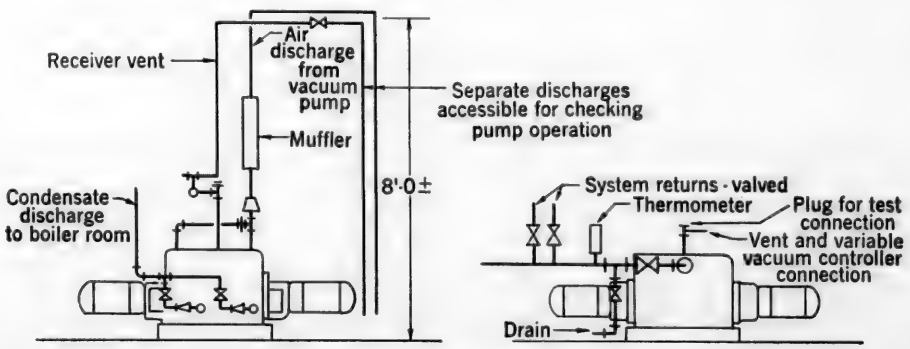


Fig. 6. Piping arrangement for a vacuum return pump. One is preferably installed for each zone.

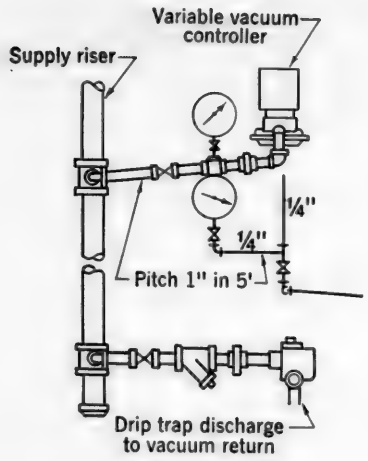


Fig. 7. Connections for a variable vacuum controller.

quired differential between the two sides of the system.

In order to promptly dissipate and equalize the induced vacuum that forms in the steam side of the system when the control valve closes, an equalizer should be provided for each zone, as shown on the sketch.

Year-Round Heating

Year-round heating should be available, when required, for operating rooms, delivery rooms and possibly other special locations. A separate distribution system which is not affected when the general heating system is shut off during the non-heating season, should be provided. This system may be supplied with steam at about 2 psi gage pressure.

Modulating type radiator supply valves and thermostats should be provided to control the temperatures in rooms on this system.

Steam and Return for Ventilating Equipment

Steam at adequate pressure (10 to 15 psi) should be supplied through a separate system to ventilating equipment which may be widely scattered through the hospital. While the temperature of the air supplied by these units may be regulated by mixing dampers controlled by a thermostat located in the discharge duct, it is advisable to provide automatic shut-off for the steam when the face dampers are completely closed, and the bypass dampers wide open. This will prevent overheating in mild weather.

Ventilation

Before determining the ventilation requirements for the hospital, the engineer should acquaint himself with the requirements or recommendations of any state or local authority having jurisdiction over hospital construction. It will also be advisable to check the recommendations of the National Fire Protection Association which are applicable.

While a ventilation system which meets the minimum requirements of such regulations and recommendations may be adequate for health and safety, it may be unsatisfactory because of drafts, noise, inadequate control, inconvenience of location of equipment, or other reasons.

The advantages and disadvantages of centralized location of ventilating equipment, as compared with unit equipment located in the area it serves, should be considered carefully.

A supply system with centrally located equipment will facilitate the operation and maintenance of the installation. It will require more extensive duct work, but will not require as extensive a steam distribution system. Automatic air-cleaning equipment may be used with a central system, and servicing of equipment can be done with minimum interference with the functions of the hospital.

Central supply systems should generally be of the draw-through type to reduce the possibility of stratification. Fans should preferably be supplied from separate intake systems, but where this is not practicable, automatic dampers should be provided on the discharge side of each fan to close when the fan is shut down. These dampers should be felted to prevent even a small inward leakage of air through the discharge ducts, which may be sufficient to cause reversed rotation of a heavy backward curved blade fan.

Heating coils which are exposed to below freezing temperatures should be of the non-freeze types, and all coils should be properly pitched for complete drainage. Coils should be individually trapped and piped with a drip leg of sufficient length to insure prompt removal of condensate. If coils are set vertically the condensate piping inside the by-pass chamber should be protected from exposure to cold by-pass air.

Where heavy snows are prevalent and the fresh air intake is on the side of the building exposed to storms, ordinary intake louvers, even though sized for moderate air velocities, may not be sufficient to keep snow from entering the intake. Suitably designed hoods may be provided to overcome this, but in any case, liberal space should be included between the fresh air intakes and filters, and drains provided for removal of any melted snow.

Where unit supply equipment is provided on each floor, it should be sized for slow fan speed, quiet operation, and if possible, provided with concealed discharge ducts to permit delivery of air at several locations with low outlet velocities, and without objectionable drafts. Where it is not possible to provide discharge duct work, the units must be selected for low outlet velocities at above head level and installed to avoid impingement on adjacent surfaces.

Antivibration mountings should be provided to prevent transmission of vibration to the building. The units should be accessible for changing filters, servicing bearings, valves, traps and controls, and drainage of coils and their removal, if required, without any necessity for cutting and patching the building.

The operation of dampers should be checked to insure that they rotate freely, open fully and close tightly under automatic control. Automatic control should also be provided to shut off steam to the coils after the face dampers are closed, to prevent overheating in mild weather.

Fresh air intake ducts should be equipped with drains for removal of any melted snow which may have entered the system. These drains should never be connected directly to the sanitary drainage system, even if they are trapped.

Exhaust ventilation should be provided from toilet-rooms, utility rooms, nurses' stations and other interior rooms, shown in Fig. 8. Toilet-room ventilation should be independent of other exhaust systems, and a minimum of

12 air-changes per hour should be provided. Other interior rooms should have 8 to 12 air changes per hour. Independent systems may be desirable from areas which are subject to only occasional use or where objectionable odors or dust are present, or where explosive or toxic gases might accumulate.

Where separate toilet rooms are provided for each bedroom, the bedroom may be exhausted through the toilet room.

If, as shown in Fig. 8 the toilet rooms are arranged back to back, with a pipe space between, at the same location on each floor, exhaust ducts may be carried up in the pipe spaces to fans located on the roof, or overhead in the top toilet rooms. If the fans are located on the roof they will be less likely to receive the attention they should, but if they are in the toilet room, it may be necessary to disturb patients to service them.

If fans are located in the toilet rooms, it is essential that fans and motors should be selected for very quiet operation.

The arrangement described will provide only limited room ventilation because the make-up air from the corridors will be short circuited to the toilet rooms.

If, because of the location or type of hospital, minimum ventilation for bedrooms as described is not considered adequate, direct exhaust for the desired number of air changes may be provided by vertical concealed ducts in the partition walls, with exhaust fans above the roof.

The capacity of the supply system will, however, have to be increased, which in turn will affect the steam distribution system and boiler plant. Because space for installation of unit supply equipment on each floor is usually very limited, it may be necessary to install this equipment in pent houses on the roof, and to provide shaft space for vertical distribution duct work to each floor.

Kitchens should have adequate ventilation for removal of heat, vapor and odors from the cooking, dishwashing and service areas. At least 20 air changes per hour should be provided, and in hot locations up to 40 changes are desirable.

Hoods should be provided over ranges, ovens, broilers, vegetable steamers and kettles. These hoods should be equipped with grease filters which may be removed for cleaning. A condensation gutter with drain should be provided around the inside of the hood, and high pressure steam smothering lines should be installed to smother grease fires.

The duct work should be sized for air velocity of at least 1500 fpm to minimize grease accumulations, and should be independent of all other systems, with not less than 18-inch clearance from combustible materials. It should be constructed of not less than 18 gage black iron with tight riveted joints. Inside laps in duct joints should project in direction against the air flow, to reduce dripping of burning grease from joints in case of fire in the ducts.

Cleanouts should be spaced not more than 20 ft apart.

A trap with cleanout for collection and removal of grease should be provided at the base of the vertical riser. Vertical risers inside the building should be enclosed in a masonry shaft of 4-inch hollow tile or its equivalent.

The exhaust fan should be located above the roof and should be provided with a clean-out door on the lower part of the casing and automatic shut down in case of fire.

Serving areas in the cafeteria, and dishwashing equipment should have hoods with the bottom edges approximately 6 ft. 6 inches above the floor. Copper duct work is preferable for dishwashers, and should be provided with watertight bottoms and drains.

Exhaust ventilation with exhaust grilles in or near the ceiling should be provided in all cooking areas for removal of hot air and vapor not exhausted by the hoods.

Preparation spaces and food dispensing stations on the various floors are usually located on outside walls with windows, and need not be ventilated separately. It may, however, be desirable to provide propeller type exhaust fans in the food dispensing stations to prevent any odors from this area being carried into the bedrooms. Six air changes per hour will generally be adequate for these rooms.

The large quantity of air which is exhausted from these areas must be replaced by direct leakage from outdoors, indirect leakage from outdoors through adjacent areas, or by means of a positive supply. Positive supply is desirable, but because of the first cost may be ruled out. In such case it will be necessary to determine where the make-up air will come from, and what can be done to provide a satisfactory source of supply. In any case, the heat required to boost the temperature of the make-up air from conditions prevailing outdoors to those inside the room must be included in determining the load on the boilers.

The central sterilizing and supply constitutes three distinct areas:

1. The work area for receiving and cleaning unsterile material and for assembling packs.
2. Sterilizing area.
3. Sterile supply area for storage and issue.

Equipment in the sterlizing area will generally consist

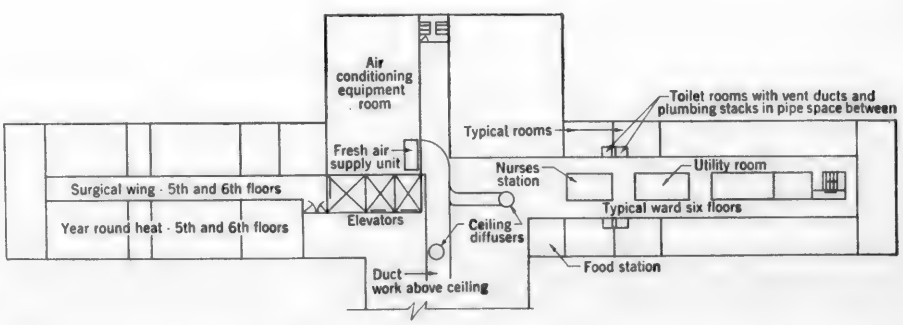

Air conditioning equipment room
Toilet rooms with vent ducts and plumbing stacks in pipe space between
Typical rooms
Fresh air supply unit
Nurses station
Utility room
Surgical wing - 5th and 6th floors
Typical ward six floors
Year round heat - 5th and 6th floors
Elevators
Ceiling diffusers
Food station
Duct work above ceiling

Fig. 8. Floor plan of the main hospital building.

of two or more large pressure sterilizers for dressings and supplies, stills for pure water, hot air sterilizers for ointments, and solution warmers, which may be built into a small masonry enclosure to reduce the release of heat to the main room.

The enclosure should be provided with exhaust ventilation for removal of heat released by the equipment. Make-up air from the main room should enter through grilles in the wall at the front of the sterilizers.

A stainless steel hood should be provided over the front of the built-in sterilizer to catch any vapor or fumes which are released when the doors are opened. Grilles should be located in the wall just below these hoods for exhausting the vapor to the enclosure.

If bed-pans are to be sterilized in the central supply, a separate exhaust system should be provided from the area in which this equipment is located.

Exhaust fans should discharge above the roof and away from windows in adjacent walls, and should exhaust directly from the sterilizer equipment enclosures.

Cleaned and tempered air (during the heating season) should be supplied by separate ventilating equipment through duct work with adjustable louvers to the glove room, needle and syringe room, solution room, clean work area and sterile storage.

All of these rooms should be kept under positive pressure and should exhaust to the receiving and clean-up area and sterilizing area, which should be kept under a negative pressure to prevent air leakage from the central supply to other parts of the building.

All duct work in the central supply area, except in the enclosure for the sterilizer and stills, should be concealed to prevent any accumulation of dust.

Two-speed operation of the fans is desirable to provide a minimum of four air changes per hour in the Winter and eight in the Summer for the rooms directly supplied with fresh air.

General ventilation only is required for the pharmacy, except small inner rooms for storage of alcohol, ether or other liquids which may give off fumes. Twelve air changes per hour should be adequate for other portions of the pharmacy.

Separate areas may be assigned in a hospital laboratory for chemistry, pathology, serology, hematology, urinalysis, bacteriology, and for a radioisotope unit. The ventilation requirements for each of these areas should be discussed with the laboratory technician in charge.

In general, laboratory tests which release deleterious fumes or odors, excessive heat, harmful bacteria or radioactive particles are carried out in hoods with glass fronts, designed for the particular service.

Exhaust ventilation through the hoods, except those used for work with bacteria and radioisotopes, should be sufficient to create a face velocity of not less than 75 fpm across the face of the hood when wide open. Operations in radiochemical hoods and those used with harmful bacteria, are usually carried on with the fronts closed and small openings, through which make up air will enter at 100 to 150 fpm. A negative pressure should be maintained in the laboratories to prevent leakage of contaminated air to other parts of the hospital.

The exhaust from virus hoods should pass through a hot flame or electric grid before being discharged to the atmosphere.

Exhaust ventilation is required in the laundry to remove vapor and heated air from ironers, presses, tumblers and washers.

Air requirements for a few sizes of flatwork ironers are as follows:

2-roll—100 inch	2500 cfm
4-roll—110 inch	5400 cfm
6-roll—120 inch	8500 cfm
12-roll—120 inch	15000 cfm

A hood with hinged glass panels should be mounted directly over the ironer.

Presses may be grouped near windows and propeller fans provided in the windows. Assuming that a four-operator press requires 12,000 cfm of air, one 8000 cfm and one 4000 cfm propeller fan may be installed to permit flexibility of operation.

Ventilation requirements for washers follow:

24 x 36 inches, 450 cfm	42 x 72 inches, 1500 cfm
30 x 48 inches, 740 cfm	44 x 84 inches, 1800 cfm
36 x 64 inches, 1200 cfm	54 x 96 inches, 2600 cfm

Washers should preferably be located near an outside wall with a metal deflector above them and propeller type exhaust fans in the windows of capacities approximating the individual washers they serve.

An exhaust pipe discharging above the roof and equipped with a lint catcher must be provided from the discharge fan on a tumbler.

Make up air for the laundry, if supplied through open windows or leakage, should enter where it can pick up heat from equipment during cold weather. In cold locations it may be necessary to provide a supply unit to supply sufficient clean tempered air to offset the air exhausted by the fans.

The morgue and autopsy rooms should be provided with exhaust ventilation to furnish 20 to 30 air changes per hour.

The equipment should discharge to a location where odors will not be objectionable. Air to these rooms should be supplied by inward leakage from adjacent areas.

Copper Corrosion Retarded by Light

Sunlight or other intense light which ordinarily accelerates the corrosion processes in metals, has been found to produce an opposite effect on copper oxidation —copper oxide growth is actually retarded by the irradiation. This unusual behavior was observed at the National Bureau of Standards as part of a continuing research project on the corrosion of copper over a wide range of controlled conditions.

In the present investigation, partially sponsored by the Corrosion Research Council, Dr. Jerome Kruger of the Bureau's corrosion laboratory immersed single copper crystals in water and found that irradiation retarded subsequent copper oxide growth. Single copper crystals were used because their relatively simple structure gives results that could be more easily calculated and easily understood.

LOUIS BLENDERMANN ON

PIPING AND PLUMBING

Suction Tanks

THE previous article discussed methods whereby a suction tank can be used to safeguard the water supply in buildings from a few stories to 20 stories in height. This article covers taller buildings, and also large industrial and manufacturing plants where enormous quantities of water are needed. However, before discussing the different building types and sites, it might be timely to mention that whenever unreliable sources of water exist at a site, it is good practice to check all the available sources with the thought of installing two or more water services into the building.

Dual Water Services

Where an inadequate water supply and pressure exists at a site, it is advisable to utilize when possible, the water resources of two separate supplies as suggested in Fig. 1. This shows a street with buildings on either side, which is typical of many of the larger cities. Referring to the buildings designated as buildings *A*, *B* and *C* the various ways that two water services may be utilized are illustrated.

Building *A* is a corner building with the water services supplied from two different street mains. The water services are combined in the building to serve the suction tank and pumping equipment.

Building *B* represents a building that extends from one street to the other. Here the water services are taken from each of the two streets. They are also joined together in the building to serve the suction tank and the pumping equipment.

Building *C* shows how two water services may be taken from the same street main and joined together in the building to serve the suction tank and pumps.

A large building cannot afford to depend on just one water service since any type of failure in this one service could disrupt all of the building's activities that are dependent upon the water supply. Therefore, when possible, two separate services should be used because they offer a more positive condition that a constant supply of water will be available at all times to replenish the suction tank.

40-Story Buildings

Figure 2 shows a building that is 40 stories in height and the basic manner in which the water distribution system, including a suction tank may be installed.

While several methods can be used to distribute water in a 40-story building, a method employing two gravity tanks is shown in Fig. 2. The tanks are placed at the 20th floor and at the 40th floor. Both of these floors are mechanical equipment floors and are the service floors for other types of equipment such as air conditioning, heating, electrical and equipment normally located at this level. Each tank is supplied by its own set of duplex pumps. One suction tank is used and each set of pumps draws water from this tank. The tank should be of sufficient size and capacity to supply both sets of pumps during their pumping cycle.

Since each gravity tank holds a water reserve for at least 20-30 minutes or more operation as designed by the engineer, the suction tank need only be large enough to supply the full pumping cycle of both pumps operating together for that time. In sizing the suction tank, the engineer must also take into consideration the rate at which the water service can replenish the suction tank to fulfill the demands of the pumping equipment.

60-Story or Taller Buildings

Figure 3 shows a typical arrangement of the water distribution system including a suction tank to serve a building 60 stories tall.

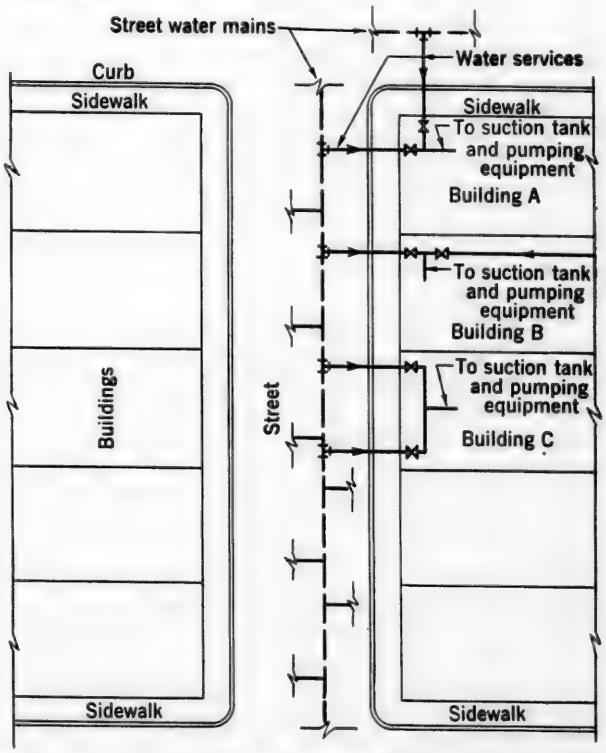


Fig. 1. Typical street with tall buildings, showing various ways for connecting house pumps to water mains in the street.

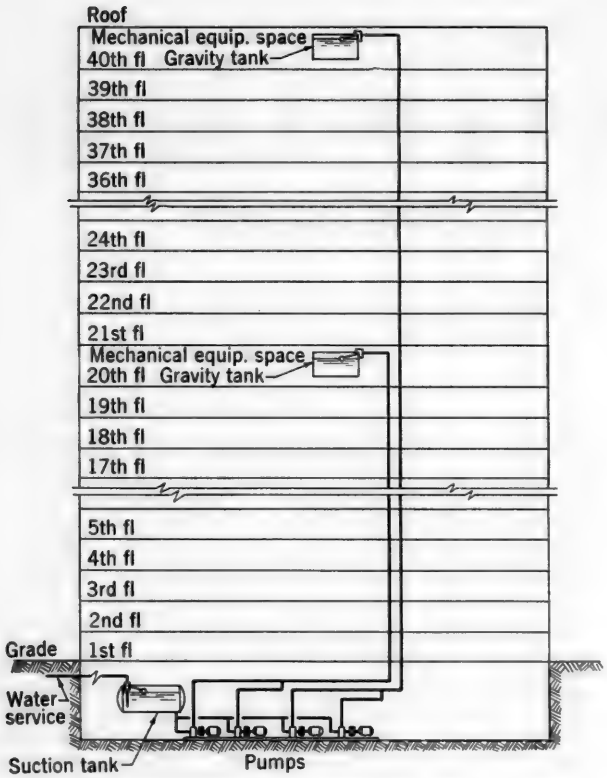


Fig. 2. How a suction tank is utilized with a water distribution system to serve a 40-story building.

Figures 1, 2, 3 and 5 are only diagrammatic, and therefore valves and other necessary devices and equipment are not shown.

A gravity tank is placed on the 20th, 40th and 60th floors—the mechanical equipment levels. Duplex pumps furnish water to each of the gravity tanks. One suction tank is used to serve all three sets of duplex pumps. Although, there are numerous methods for distributing water in a 60-story building, the method illustrated in Fig. 3, has been shown for example only. The sizing of the suction tank for this arrangement may be handled in a similar manner to that explained for the 40-story building.

Large Industrial Sites

When large industrial, manufacturing, processing or other types of establishments that use considerable quantities of water are involved, it is important that an adequate supply of water be provided. For example, refer to the site shown in Fig. 4. This illustrates how a building may be located on a site and the manner in which the water is supplied to the elevated storage tank and thence to the building.

Since many of such industrial plants are located away from the nearest city or town, the water supply may have to travel a number of miles from the nearest source to serve the plant. If the water company installs the water line they generally try to size it adequately for the demand of the building. Often, however, the plant may have to obtain its water from an existing water main located in a nearby street or highway. It is then quite possible that the water line is not of adequate size to supply the exacting water demands of the plant. In this event, it is necessary to provide an elevated storage tank on the site. In addition to the necessary water storage on the site, the elevated storage tank assures a sufficient water pressure.

Referring to Fig. 4, a water service is extended from the street main to the pumping equipment that is located at the base of the elevated storage tank. The pumping equipment replenishes the storage tank. Since the storage tank supplies all the needs of the plant, it must contain an ample quantity of water. It is not unusual therefore, that an elevated storage tank holds 50,000 gal or more.

Undersized Water Mains

Many times the water main that serves an industrial building is not capable of delivering a dependable supply of water for this undersized main must also furnish water to nearby plants. The engineer must take every precaution to be certain that his proposed building will receive an adequate supply, even when pumps are drawing water for the nearby plants. There are a number of ways that an adequate supply or reserve can be obtained. One method, illustrated in Fig. 5, is by means of an underground suction tank.

Detail *A* in Fig. 5 shows how the water supply is hooked up when the water pressure to a site is adequate. You will note that the water service is run to the pumping equipment at the base of the elevated storage tank where it is raised up to the storage tank. If the water pressure is sufficient, it can directly supply the tank, with the pumps then acting as boosters. A water meter pit containing a water meter and other equipment as may be required by the local water company is installed just inside the property line.

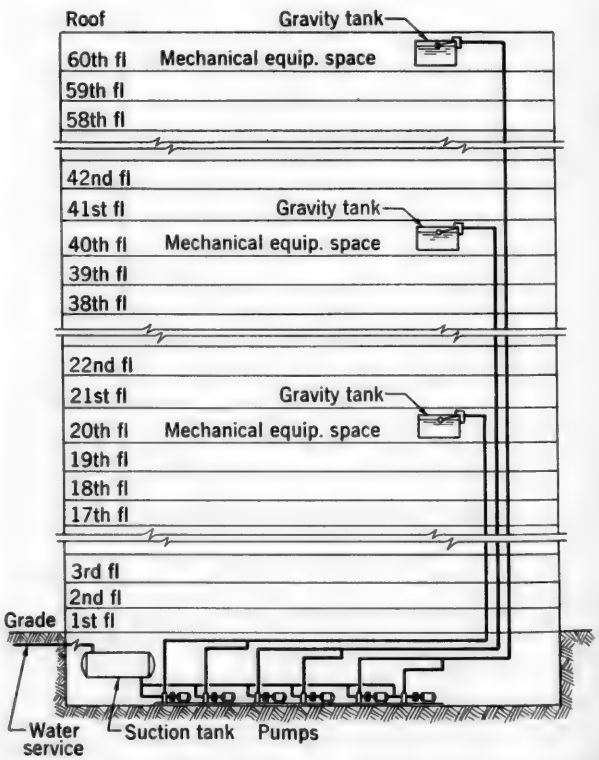


Fig. 3. How a suction tank and water distribution system is used to serve a 60-story building.

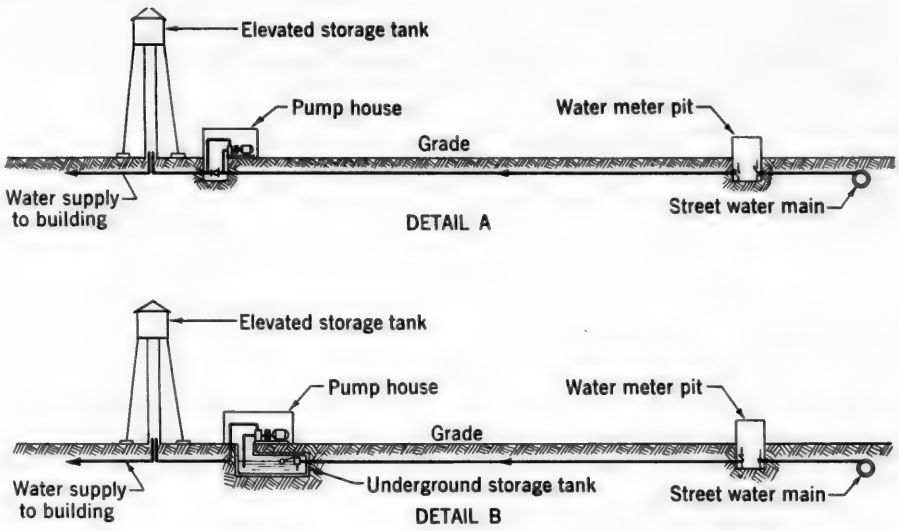


Fig. 5. Two methods that may be used to supply water. Use of an elevated storage tank, and combination of elevated storage tank and underground storage tank to serve a building with water.

Detail *B* shows how a suction tank may be applied where the water service is unable to fulfill the capacity of the pumping equipment during its cycle of operation. Here, for the purpose of example, the suction tank is located underground. In fact, it is located under the small building that houses the pumping equipment. The size of this underground suction tank is dependent upon a number of factors such as the rate of water flow in the water service line, the rate at which the storage tank must be replenished, and the capacity of the pumping equipment in gallons per minute. All must be taken into consideration when sizing the suction tank. The engineer must determine how much underground water storage is needed.

Underground Storage of Water

Many plants today have enormous underground storage tanks, some holding in excess of a 1,000,000 gal of water. Such tanks are designed to provide a constant supply of water despite any disruption of water service by a water main break or other cause.

The engineer must size the underground storage tank in accordance with the water requirements of the plant, and the hours or days that the storage tank will be expected to handle the water requirements until normal water supply delivery is resumed in the outside water main.

Even though a large underground storage tank is utilized, an elevated storage tank is still needed. The arrangement of the elevated storage tank is similar to that shown in Detail *A* or *B*. The tank supplies the building and the large underground storage serves as a reserve tank. Periodically, the water in the underground storage tank is used for replenishing the elevated storage tank. This design helps to maintain a fresh supply of water in the underground tank. Water is pumped from the underground tank by (1) pumps located near this tank or (2) by other pumping means.

Underground storage tanks are used in some of the new government projects to serve as an emergency water supply in the event of an enemy bombing attack. In this instance, the water is piped independently to the building by a separate means of pumping and is used to serve only certain fixtures.

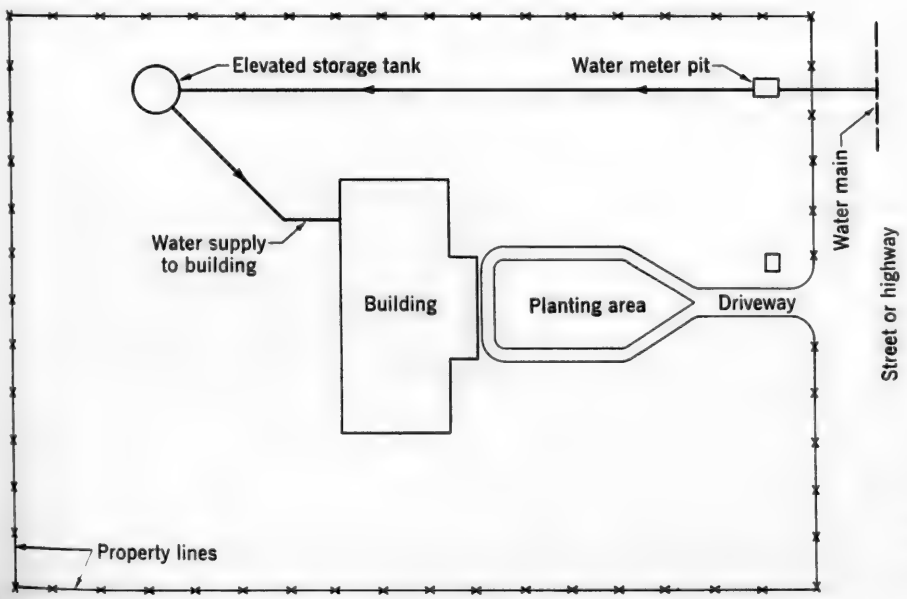


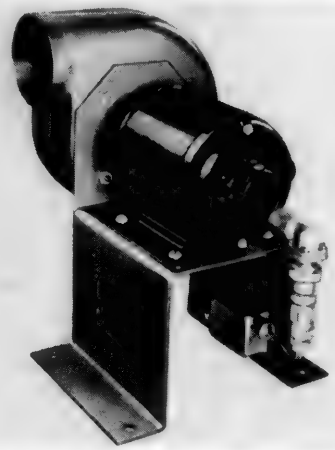
Fig. 4. One way of supplying water to an elevated storage tank serving an industrial building.

NEWS OF EQUIPMENT AND MATERIALS

Use the convenient prepaid postcard appearing on the last page for securing additional information about new equipment and materials described in this department.

For Vehicle Heater Supply

Three new centrifugal blowers, designed specifically for use in vehicle heater supply systems, are part of a line of air-moving units now available from American Blower Div., American-Standard, Detroit, Mich.



The model shown is a small blower designed for use as a truck cab heater. It is a 1/50-hp design capable of moving 97 cfm of air at free delivery. Its totally enclosed d-c drive motor operates at 3450 rpm; is coupled with a shielded lead filter for radio interference suppression.

The other two models are double air inlet, high volume blowers suitable for V-belt drive. Rigid construction in these designs makes them adaptable to military applications such as personnel heater supply blowers in trailers.

More information? Circle Item 1, postcard, last page.

Expansion Valves Improved

Two engineering advances are announced by Alco Valve Co., St. Louis, Mo., both dealing with its line of Thermo expansion valves.

The first is a new design for its power assembly, which limits the amount of flexing to which the diaphragm is subjected. The second is a new remote bulb and well design which gives a rate of response equal to, and in most cases, better than, the standard gas-charged thermostatic expansion valve, the company states.

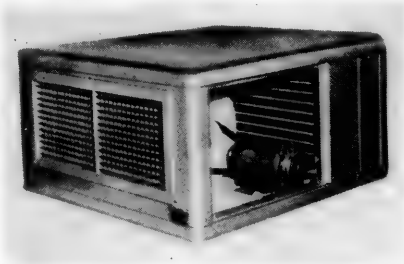
The Contour power assembly design is said to increase diaphragm life up to 10 times over standard power assemblies. Basically, the design limits the amount of travel in a diaphragm and thus limits the extreme flexing experienced when the diaphragm is subjected to high pressures on the underside during hot gas defrost and on reverse cycle installations. The design is now standard on all of company's Series *T* and Series *HTL* Thermo valves. It is obtainable on larger valves on special order.

The second advance, a rapid response remote bulb and well design, will give more rapid response to temperature changes in the line, thus providing extra-quick closing, necessary for both positive protection against liquid flood-back as well as smooth control for optimum system performance, the company says.

More information? Circle Item 2, postcard, last page.

Ceiling-Mounted Conditioning Unit

Illustrated is the Bohn Model CH, manufactured by the Betz Div., Bohn Aluminum & Brass Corp., Danville, Ill. Unit is a horizontal-type blower evaporator, ceiling mounted for air-conditioning stores, shops, offices, restaurants, and similar installations.

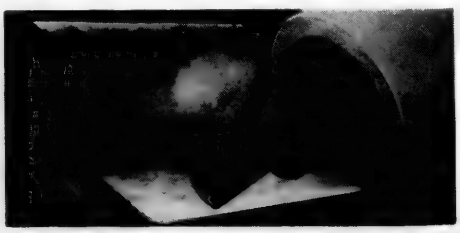


Its attractive cabinet permits mounting directly in the conditioned space, or the unit can be remotely mounted and connected to a duct system. Space for steam or hot water coil permits simple conversion to a year-round air conditioning and heating unit. Sectional side panels are provided for easy inspection and maintenance. Filters are removable from either side. Blower capacity is a full-rated 400 cfm per ton. In duct or grille models, unit is available in capacities of 2, 3, 4, 5, and 7½ tons.

More information? Circle Item 3, postcard, last page.

Expand Insulation Line

Glass fiber insulation tradenamed Superglas is added to the lines of insulation available from Eagle-Picher Co., Cincinnati, Ohio. Multiple layer pipe insulation, as shown



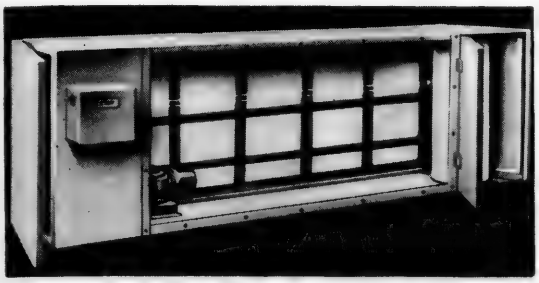
at right, and flexible duct insulation, left, are two of twelve in the new line, supplementing the company's mineral wool and magnesia products.

Addition of glass fiber brings the number of insulations offered by the company to 38, covering a range of temperatures from sub-zero to 2300 deg F.

More information? Circle Item 4, postcard, last page.

Add-On Dry Filter

A compact dry type air filter, known as the Far Air Roll-Kleen Type H automatic filter, is introduced by Farr Company, Los Angeles, Calif.,



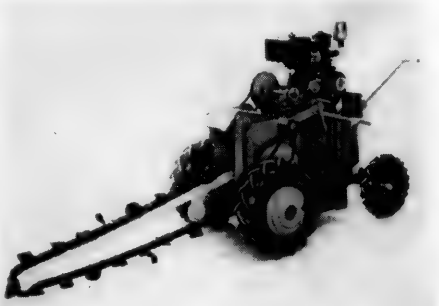
Filter is designed for use as a simple attachment for all types and models of air handling units. It has a heavy gage metal frame which holds a large, replaceable roll of glass fiber filtering media and a power driven take-up spool. Electric controls govern the automatic movement of the media across the face of the filtering area.

The Type H incorporates the basic design features of the company's standard automatic filter with modifications required for operation as an integral section of an air handling unit. Its features include high or low velocity, high efficiency, large dirt holding capacity, minimum maintenance requirements and a large effective filtering area in proportion to the unit's overall size, the company states.

More information? Circle Item 5, postcard, last page.

One-Man Trencher

Arps Corporation, New Holstein, Wis., announces development of a one-man operated trencher called Trench-Devil, Model M. It is designed for use by contractors, utilities, municipalities and custom workers requiring a



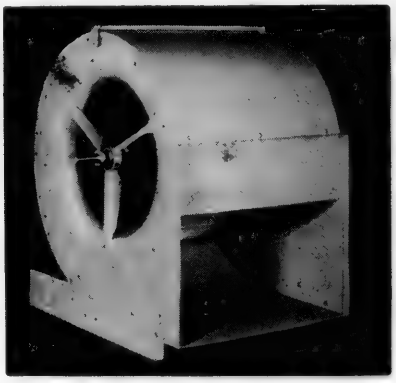
low cost, duty trencher for a wide variety of jobs. Weighing approximately 815 lb, the unit can be easily skid-loaded on pickup trucks or small trailers, or it may be transported for short distances under its own power, at 2½ mph.

There are four digging widths—2¾, 4, 6 and 8 inches, up to 42 inches deep. Digging speed is variable from 0 to 1200-ft per hr. At the 30-inch depth, digging speed averages 120 ft per hr with an 8-inch width; a 24-inch depth increases digging speed to 800 ft per hr at the 4-inch width. By moving a small lever, hydraulic drive permits instantaneous reversal of direction while digging, making it possible to dig vertically along a wall. Hydraulic drive also permits immediate speed changes throughout the entire digging range by turning a speed control handle.

More information? Circle Item 6, postcard, last page.

Improved Blower Assembly

Called Series A Preslok blower assembly, this new equipment from Lau Blower Co., Dayton, Ohio, is said to represent an improvement in manufacturing methods as compared with similar size previous models. Yet the design gives a higher maximum rpm rating with less impedance to air flow.



Heart of the design is an 18-inch dia blower wheel. This is the newest and largest size in this design; other sizes are 9, 10, 12, and 15-inch dia. Each blade is mechanically attached to the center disc by four individual steel fingers individually pressed within the blade. An extra ⅜ inch is added to the end ring for more rigidity and to bear the stress of higher speeds. This positive mechanical lock prevents blades from flying off at the higher speeds.

The wheel is mounted within the blower shell using a tripod type bearing. This mounting gives more side space resulting in less impedance to the air flow. Carefully located punched holes on the scroll sides provide multiple mounting possibilities for practically any angle of air discharge. Preliminary tests of the entire assembly indicate it will sucessfully operate in excess of 1000 rpm at 2½-inches static pressure or better. Air delivery is rated at 3200 to 8000 cfm.

More information? Circle Item 7, postcard, last page.

Boilers Guaranteed 20 Years

Heating & Cooling Div., Burnham Corp., Irvington, N. Y., has announced a 20-year guarantee on cored cast iron sections of the following cast iron hot water heating boilers in the Burnham line: any Jubilee, Pace-Pak, Pacemaker, Yello-Jacket or Holiday boiler manufactured after January 1, 1958. It guarantees against defective materials or workmanship under normal operating conditions provided boiler is installed and operated in accordance with stated proper instructions.

More information? Circle Item 8, postcard, last page.

Self-Adhering Insulation

Insulating applications of polyurethane have been extended by means of a development from Richards, Parents & Murray, Inc., New York, N.Y. The company has applied a permanent, pressure sensitive adhesive, with an easy-to-strip paper backing, to the soft, flexible, and inert insulating material (K value: 0.21). Available in

either sheet or roll form, the self-adhering insulation comes in thicknesses from ¼ to 2 inches.

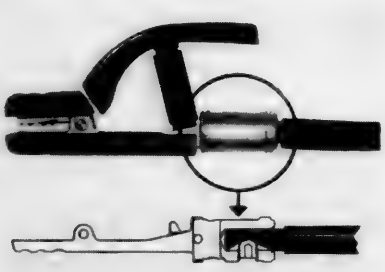
Seen as having a major application in duct insulating, the insulation, with the paper backing stripped away, adheres immediately with no application of heat or solvents and sets in a permanent bond with the metal. An interesting feature of the material is that it may be applied flat to sheet metal before bending. The metal can then be formed with the insulation in place, as illustrated.

More information? Circle Item 9, postcard, last page.

Electrode Holders

An improved line of electrode holders equipped with the company's ball-point type cable connection is announced by Tweco Products, Inc., Wichita, Kan.

Using the ball-point connection, a Twecotong electrode holder can be installed on a welding cable in less than two minutes. And, by eliminating the use of shim stock



and a pressure plate, the new connection allows the use of larger sizes of cable than formerly possible.

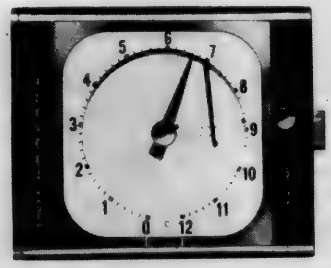
The connection is simple in design, yet positive in its action. A cable socket is drilled in the end of the holder body casting. At right angles to this socket another hole is drilled and tapped. A cadmium-plated ball-point steel screw goes in the tapped hole. The weldor simply strips one inch of cable jacket, inserts the cable strands in the cable socket, and then tightens the ball-point screw, by means of 7/32-inch hex drive wrench, directly on the cable strands. Every cable strand is under pressure, thereby eliminating the heating problems common to most other types of holder cable connections, the company states.

More information? Circle Item 10, postcard, last page.

Indicating Potentiometers

An indicating version of the Dynamaster self-balancing electronic potentiometer or bridge is announced by The Bristol Co., Waterbury, Conn.

This indicator is designed for use when legibility of the indicating scale from greater distances is an important



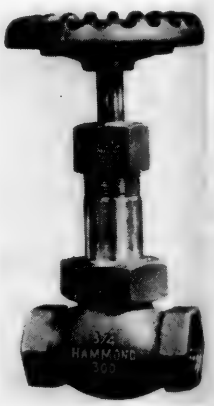
factor. This instrument has the same 32-inch-long scale and the same pointer as the standard round-chart recording Dynamaster, and is mounted in a standard case. There is no recording mechanism, however, and the instrument indicates only.

The instrument is also offered in electric control models, in on-off, two-position, three-position, floating, proportional, and current-input types of control. It can be used for measurements of such variables as temperature, speed, pressure, smoke density, pH, and electrical values.

More information? Circle Item 11, postcard, last page.

Plug Type Globe Valve

Development and production of plug type globe valves with 500 Brinnell hardened stainless steel renewable seat and disc for 150-, 200- and 300-lb working steam pressure is announced by Hammond Brass Works, Hammond, Ind.



This valve is recommended for service demanding extreme resistance to corrosive action on seat bearings such as is caused by throttling, wire draw, and foreign particles. It affords maximum resistance to erosive service, where abrasion is present, the company states.

Plug type globe valves are available in sizes ranging from ¼ through 2 inches.

More information? Circle Item 12, postcard, last page.

90-Deg Elbow Spray Nozzle

Because equipment often provides limited space for the installation of spray nozzles, Spraying Systems Co., Bellwood, Ill., has designed a new line of FullJet spray nozzles, with the body of the nozzle providing a 90-deg angle elbow turn.

Where the spray must be directed at a 90-deg angle to the inlet pipe, these nozzles may be installed without use of additional fittings. Identified as Series ½-GA, these nozzles provide a full cone spray pattern with uniform distribution. Choice of spray angles are offered in the standard 65 deg angle type and wide angle 120 deg type.

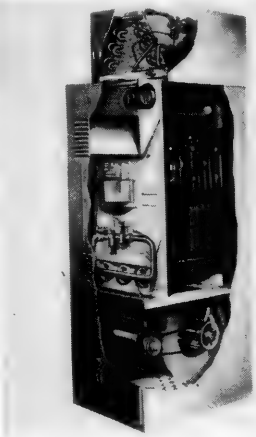
Typical applications include installation in equipment for cooling and washing.

These nozzles make possible complete nozzle selection to meet any installation need. Data Sheet 7790 contains complete story.

More information? Circle Item 13, postcard, last page.

Residential Line Announced

The Trane Company, La Crosse, Wis., announces a series of new products which, used in combination, will provide complete residential year-round air conditioning: gas-fired furnaces for heating only, cooling components for addition to existing warm air heating systems, and cooling equipment for use in homes with wet heat systems and other cooling applications requiring independent air delivery.



In total, the company will market five belt-driven up-flow discharge furnaces, ranging in input from 77,000 to 155,000 Btu per hr. Attractively housed with all wiring and controls concealed but easily accessible, the furnaces will be available for use with natural mixed, or LP gas. To achieve year-round air conditioning, a remote condensing unit and a furnace-mounted cooling coil, as illustrated, are combined with the furnace. Operating without water, the condensing unit is available in 2, 3, and 5-ton sizes.

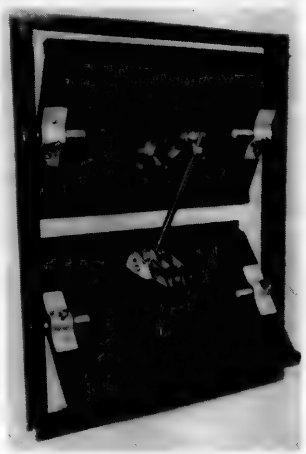
The company also will build a duct cooling coil for use where head room is limited. This inclined coil provides horizontal air flow and consists of a coil, casing, expansion valve, and drain pan for connection to ductwork.

For use with existing wet heat systems or other cooling applications requiring independent air delivery, the company will market fan-coil units in three sizes, 2, 3, and 5 tons, to match the condensing units. Also available will be an accessory discharge chamber for free discharge for commercial application. The fan-coil unit with discharge chamber, combined with the air-cooled condenser installed on roof or other outside location, is suited for horizontal, space-saving commercial installation.

More information? Circle Item 14, postcard, last page.

Opposed Action Linkage

An opposed action linkage set for multi-blade dampers is announced by Duro-Dyne Corp., Farmingdale, New York. Called Opax, set consists of two specially designed brackets plus pre-attached linkage rod which when mounted according to the simple instructions provided, will accurately operate damper blades of all sizes in common use.



Linkage set incorporates the company's Neva-Bind action which provides 4-way self-adjustability for construction inaccuracies, prevents binding, and reduces assembly time to a minimum.

More information? Circle Item 15, postcard, last page.

Pressure-Compensating Steam Meter

The Shuntflo meter, claimed by the manufacturer, Builders-Providence, Inc., Providence, R.I., to be the most practical self-contained and self-operated steam meter, is now extended in usefulness by the addition of a pressure-compensating counter box. With this development, the meter automatically and continuously corrects for pressure variations in the steam line, registering consumption accurately in pounds of steam even when major pressure fluctuations are encountered.

The basic design of the meter has not been altered by the pressure-compensating counter. With meters now in service, the new feature can be obtained by simply replacing the standard counter box with a pressure-compensating counter box. No special tools or gaskets and no machining are required to make this change, and the meter does not have to be removed from the line.

More information? Circle Item 16, postcard, last page.

Pipe Fitting Insulation

Fiberglas pipe fitting insulation designed to cut down construction costs and labor time is introduced by Fibrous Glass Products, Inc., Hicksville, L. I., N. Y. The

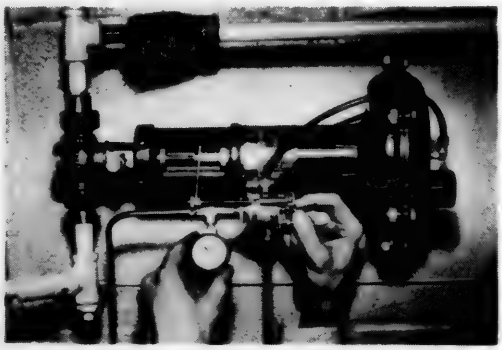
Fitrite product is molded in interchangeable matching halves and is offered for sale in sizes to fit all standard pipe fittings of every size.

The matching halves join quickly, eliminating the specialized work of winding insulation around T-joints or other fittings. When placed around the fitting, the insulation is immediately ready for taping, wiring, or stapling. The molded shape is said to be retained for the life of the insulation. Each unit has 2½ to 3 inches of extra insulation on each end to provide easier joining with regular pipe insulation. All insulation pieces have the fitting number and size molded into the interior of the product.

More information? Circle Item 17, postcard, last page.

Adjustable Pneumatic Relay

An ordinary screwdriver and wrench are all that are needed to install an adjustable positioning relay to provide accurate control of pneumatic motors and valves. Announced by The Powers Regulator Co., Skokie, Ill., the Sta-Put relay counteracts the effects of friction and load



factors which prevent a pneumatic motor or valve from responding properly and assures specified performance of new equipment by compensating for extraneous factors, the company says. It can also be used to tune up sluggish existing motors and valves, or adapt them to increased load conditions.

Half the size of predecessor models, the relay attaches directly to the controlled motor or valve. No drilling or fabricated parts are required. By moving the sliding button on the lever of the relay, as shown the open-to-close range of a pneumatic valve can be easily adjusted between 2 and 13 psi. Another simple adjustment permits various starting points between 2 and 15 psi.

The relay can be fitted to 3-, 4-, and 6-inch pneumatic motors, and to 8- and 12-inch diaphragm valves. One relay can handle multiple installations of four 6-inch or ten 4-inch motors.

Normal supply air pressure recommended is 20 psi. Maximum air pressure is 25 psi. The company says reliable performance can be expected from 20 degrees F to 180 degrees F.

List price of the relay with kit for field mounting is $30. For factory mounting, the price is $40.

More information? Circle Item 18, postcard, last page.

Unit Ventilator Control Package

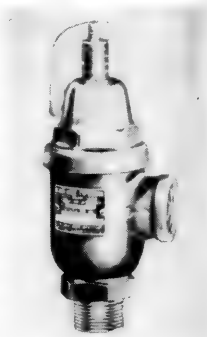
Announced by Barber-Colman Co., Rockford, Ill., is a control package which may be applied to any conventional classroom type electric heat unit ventilator (such as those manufactured by Chromalox, Trane, Nesbitt, Herman Nelson, etc.). Its positive-acting step control eliminates the necessity of expensive variable voltage regulators and magnetic contactors in the control of electrical input to the heating elements.

The package consists of a dual-element thermostat which provides control of both room and discharge air, an electric motor operator to position heater control switches and outdoor and return air dampers in proper sequence to provide standard ASHAE unit ventilator control cycle Y, and a step controller for control of heaters. Control package is completely prewired.

More information? Circle Item 19, postcard, last page.

Temperature-Pressure Relief Valves

A new series of self-closing combination temperature and pressure relief valves for automatic storage-type water heaters, storage tanks, and booster heaters is announced by A. W. Cash Valve Mfg. Corp., Decatur, Ill. Valves incorporate design features which qualify their listing, certification, and rating by both the AGA with a hot water discharge rating and the ASME with an emergency steam discharge rating.



Designated Type FV Series, there are eleven different bronze models offering a selection of pipe sizes, optional male or female inlet connections, and optional fixture connections.

Completely automatic, the valves reseat after either temperature or pressure relief. Pressure relief range is 75 to 150 psi. Standard setting is 125 psi unless specified otherwise. Temperature relief is at 210 deg F only.

More information? Circle Item 20, postcard, last page.

Aluminum Jacketing Elbow

A new type of aluminum jacketing elbow that enables a limited number of units to cover most sizes of insulated piping is being distributed nationally by the Pittsburgh Corning Corp., Pittsburgh, Pa.

The secret of the fitting, called the Gasco humped aluminum elbow, is the oversize radius or hump that allows its use over several pipe and insulation sizes and allows it to fit long and short radius ells. Twelve interchangeable sizes of humped ells fit over 107 combinations of varying pipe sizes and insulation thicknesses. Due to this versatility, the user or installing contractor needs only a minimum number of sizes to accommodate a full range of pipe sizes and insulation thicknesses. Inventory requirements are reduced and, in addition, each fitting cover can be used on several fitting sizes when salvaged.

Elbows are made of heavier gage aluminum than standard jacketing elbows. The covers are supplied in two halves which nest together and take up very little storage space. They are installed with sheet metal screws and may be removed for inspection or salvage.

More information? Circle Item 21, postcard, last page.

Institutional Wall-Hung Model

Off-the-floor wall-hung models have been added to the Super Secure Ware unbreakable aluminum line of plumbing fixtures manufactured by Aluminum Plumbing Fixture Corp., Burlingame, Calif. To permit more complete toilet room cleanliness, the wall-hung model allows mopping from wall to wall, under fixtures.

The need in institutions for a plumbing fixture specifically designed to withstand a great deal of punishment is well known. Breakage problems and replacement costs are eliminated with cast aluminum plumbing fixtures, the company states.

Fixtures are furnished in "as cast" aluminum coating or in rugged, non-chip coating in white or pastel colors.

More information? Circle Item 22, postcard, last page.

Pyrometric Controller

An 8 x 7 x 2-inch pyrometric controller in four models for 115 and 230-volt operation is announced by E. Vernon Hill & Co., Lake Geneva, Wis. It is designed to adjust and regulate power input to electrically heated devices such as ovens and furnaces by interrupting the current supply at a variable rate.

In addition to providing convenient adjustment of power for establishment of a specific temperature level, the controller automatically compensates for line voltage and ambient temperature fluctuations, the company states. As an adjuster it is said to provide an efficient substitute for rheostats and variable transformers. As a regulator, it serves as a low cost substitute for more elaborate potentiometric and galvanometric regulators in systems where changes in load are not substantial.

A bimetal switch, operating through a mercury switch, interrupts power at a sufficiently rapid rate to prevent overshoot. Adjustment is precise, the manufacturer asserts, permitting reproducibility of setting to approximately 1 deg F in a given system.

More information? Circle Item 23, postcard, last page.

Rod Hanger Clamps Cut Costs

Only a hammer is needed to quickly install Gat rod hanger clamps on beams or joists, according to the manufacturer, Geo. A. Tinnerman Corp., Cleveland, Ohio.

Of pressed metal with integral gripping teeth, they were developed to help the Geo. P. Little Company achieve a faster, more economical means of installing suspended ceilings. Furnished at a unit cost of 21 cents, savings were almost 50%. The clamps may be used to hang plumbing, heating, and electrical equipment by means of rods or straps. They are first driven onto the ends of the hanger rods with one or two hammer blows and then hammered into place on the lower flange of the bar joist or other structural support.

More information? Circle Item 24, postcard, last page.

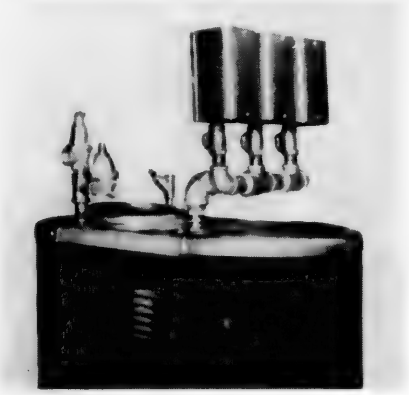
Expand Burner Line

Model S-3 burner, with capacity of 6 to 10 gph is announced by Sun-Ray Burner Mfg. Co., Jamaica, N. Y. Its housing is aerodynamically designed specifically for the shell combustion head, said to result in cleaner, quieter, and more economical operation. Delayed action oil valve and built-in electronic controls mounted and wired are standard equipment. Price also includes plain thermostat and standard limit control.

More information? Circle Item 25, postcard, last page.

Motorized Zone Control Valves

The successful development and use of ¾ and 1-inch motorized zone control valves for hot water heating systems is announced by Edwards Engineering Corp., Pompton Plains, N. J. Valves are offered as a quick and quiet means of providing comfort conditions throughout modern split-level and rambling ranch dwellings, as well as multi-zoned apartments, office, and store buildings.



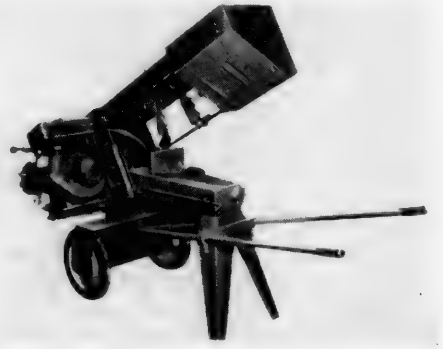
Valves require low-voltage wiring, making the system more economical and safer than high-voltage systems. Electricity is used by the valves only during the ten-second period required to open them. No current at all is drawn to hold the valves after they are opened or closed upon signal from the controlling thermostat.

From one to six thermostats, each activating a separate valve, can be joined on the same system. The same signal also turns on the burner and pump. A major improvement over previous systems is that the company's method requires a single pump, regardless of the number of valves. The new design, the company reports, insures positive shut-off, so that no thermal leakage occurs when the valve is closed.

More information? Circle Item 26, postcard, last page.

Portable Band Saw

A gasoline-engine powered Kalamobile, a portable horizontal metal cutting band saw for use primarily where power is not readily available, is manufactured by Machine Tool Div., Kalamazoo Tank & Silo Co., Kalamazoo, Mich.



Called MG610D, it is said to be fast, accurate and a labor saver. It is used for all types of intermittent cut-off work such as pipe, cable, channel, conduit, and angles. The unit is powered by a Continental Red Seal, 2-hp gasoline engine.

The chassis is rolled about on 12-inch solid rubber tired wheels. Collapsible handles are telescoped into the handle tubes, eliminating objectionable interference when the machine is in operation. The handles are rubber gripped and utilize a half-way stop for an alternate degree of carrying leverage.

More information? Circle Item 27, postcard, last page.

Zipper-type Duct Wrap

Announcement is made by Zippertubing Company, Los Angeles, Calif., of a zipper-type duct wrap that holds insulation in place, reflects heat, and provides protection against abrasion for heating and cooling pipes and ducts. Use of the new product is said to reduce installation costs up to 90% over conventional methods (one man can zip the duct wrap at the rate of 20 ft per min),

and to provide reaccessibility to work points.

The duct wrap can be used to repair or replace aging insulation jackets, and permits inexpensive application of a heat-reflecting duct jacket. It is manufactured in vinyl-coated Fiberglas, with or without aluminum reflective lining, and in Mylar; it is available in sizes of ⅜-inch ID and up.

Aluminum-lined, the duct wrap has a temperature rating of 300 deg F; without lining, its temperature rating is 266 deg.

More information? Circle Item 28, postcard, last page.

Totally-Enclosed D-C Motors

Introduction of a line of totally-enclosed d-c motors with self-contained heat exchanger cooling for operation in highly contaminated atmospheres has been announced by Allis-Chalmers Mfg. Co., Milwaukee, Wis.

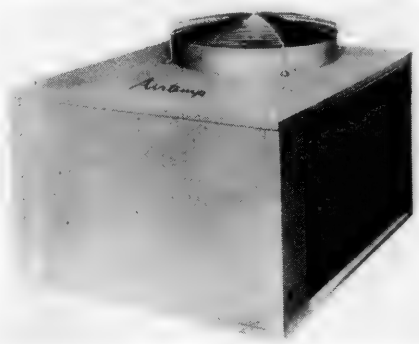
Available in constant or adjustable speeds in frame sizes of EB-120 and up and in ratings from 10 through 200 hp, these motors are designed for machine tool, steel mill drive, paper mill, cement, and rubber plant applications as well as for use in other locations having airborne foreign matter.

The motor's independent cooling system is unaffected by the speed of the motor and a thermostatic relay in the hot air stream at the commutator end shuts down the drive or operates an alarm in case of blower motor power failure.

More information? Circle Item 29, postcard, last page.

Air-Cooled Condensing Unit

Model 1203-4, 3 hp air cooled condensing unit is announced by Airtemp Div., Chrysler Corp., Dayton, Ohio. Weighing less than 300 lb, the ultra-compact conditioner requires only 8.5 sq ft of installation space. It is designed for easy application to new or existing forced air heating systems. Paired with either a counterflow furnace



cooling coil, "V" type cooling coil (installed directly over the furnace), duct-located horizontal cooling coil, vertical evaporator blower unit or combination coil-blower unit, the conditioner can be used for either residential or commercial cooling.

Features include: a completely new Airtemp-manufactured hermetic compressor; bonderized steel cabinet; quick response expansion valve; magnetic starter with magnetic overload protection and hi-low pressure cut-out; built-in service valves and service gage connections; permanently lubricated ball bearings on blower and motor; combination receiver, and refrigerant liquid purifier.

Unit has been UL approved for outdoor installation. Refrigerant system carries a full five year warranty.

More information? Circle Item 30, postcard, last page.

Drinking Fountains in 3 Models

Plumbing contractors looking for advanced designs in drinking fountains will find that the new line of vitreous china fountains announced by Kohler Co., of Kohler, Wis., meets their specifications, the company asserts.

Models in the line harmonize with contemporary interior decors and architectural trends. They also have new engineering features which increase functional ef-

ficiency. The drinking fountains meet all plumbing code requirements. Non-squirting bubblers are of compact design, stand well above the fountain rims, and are placed at the left for more convenient use. A metal guard protects against mouth contact. Uniform flow under varying pressure is maintained by a volume regulator. All fittings are of all-brass construction, chrome-plated.

The three new models are shown in illustration. The Saybrook, center, is 10 inches in height with a ¾-inch back. The Millbrook, left, features a 6-inch back with an over-all height of 15¼ inches. Highbrook, at right, with an ample 13-inch back and an over-all height of 22¼ inches is available with a conveniently located push-button glass filler when specified. All models are mounted on concealed wall hangers.

More information? Circle Item 31, postcard, last page.

Steel Blower Wheels

A series of blower wheels in 15-inch diameters is introduced by Morrison Products, Inc., Cleveland, Ohio. They will be interchangeable with existing wheels and assemblies.

Width of the new wheels will range from 6 to 16 inches and will deliver air up to 4800 cfm. These 150 Series wheels, as they will be called, will have standard size bores of ¾, 1, and 13/16 inches.

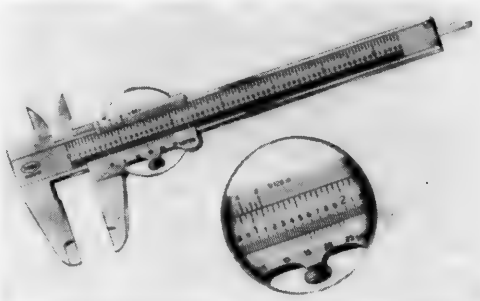
They are made from cold-rolled steel and are processed through a multi-stage wash. This phosphotizes the wheels prior to painting in an Epon resin finish. They will also be available made from continuous strip galvanized steel for air conditioning application.

More information? Circle Item 32, postcard, last page.

Vernier Calipers in 2 Models

A significant advance in caliper design is announced by George Scherr Co., New York, N. Y. The company's Lustro-Chrome stainless steel vernier caliper, in 2 models, takes the glare out of caliper readings, a vital aid for measuring instantaneously and accurately in thousandths of an inch, even under poor lighting.

A raised edge design was created to give full and lasting protection to the dull chromed surface, the raised edges acting as a guideway for the vernier scale.

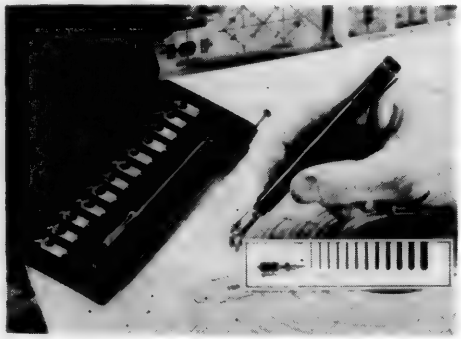


Company's toolmakers vernier caliper has extra long jaws and sensitive fine adjustment screw, and is available with 8, 10 and 12-inch measuring capacity. The Shop vernier caliper, illustrated, is designed for measuring of outside, inside, and depth dimensions with a measuring capacity of 5 5/16 inches. The cross horns permit measuring the diameter of the smallest holes and distances between them.

More information? Circle Item 33, postcard, last page.

Pen Kit for Templates

A specialized pen kit intended to facilitate speed and uniformity in template and lettering guide work is announced by Laramie Chemical Corp., Stamford, Conn.



Called Omnigraphos, the kit combines a fountain barrelled pen with 12 width-set tubular nibs able to draw or match ink lines from 0.3 mm to 2.5 mm, regardless of the curves it must follow in the most complicated templates, the company states.

An unusual offset angle of the interchangeable nib is said to permit it to hug the guide-slot walls tightly. Price of kit is fifteen dollars.

More information? Circle Item 34, postcard, last page.

Solenoid Valves

Available for immediate delivery in any quantity are low-cost (Type M) solenoid valves introduced by J. D. Gould Co., Indianapolis, Ind. Molded epoxy resin water-

proof coils, unbreakable piston rings, and guided pilot valve seats are standard equipment. These general service valves come in nine sizes from 3/8 to 3 inches, with prices starting above thirteen dollars. They are rated at 200 WSP, 400 WOG.

More information? Circle Item 35, postcard, last page.

Product Protects Oil Tanks

A product designed to eliminate the varnish and sludge in heating oils which are major causes of oil burner shutdowns, and to reduce corrosion of home and industrial fuel storage tanks, is announced by Johns Manufacturing Co., Middlesex, N. J.

The device, a bar of magnesium-alloy metal about 4-inches long, is known as Magna-Bar. It can be installed in an oil storage tank in thirty seconds, and is suspended from a wire which is attached to the tank cap. The cap, wire, and metal bar come as a unit, and two types are available for indoor, and outdoor or underground tanks. The metal is said to achieve its effect by means of a chemical reaction in which varnish and sludge-forming catalysts and corrosive acids formed in the tank are neutralized. Corrosion that does occur attacks the alkaline alloy bar rather than the tank itself.

More information? Circle Item 36, postcard, last page.

Finned Radiation and Enclosures

Simplicity of design, sturdiness, and ease of installation are features of Herman Nelson Type Q finned radiation and enclosures introduced by American Air Filter Co., Inc., Louisville, Ky. The finned radiation, particularly adaptable to school buildings, has been designed and constructed to last for the life of the building, the company states.

Use of concealed fasteners, rounded corners, a minimum of seams and a cover front which is free of grilles, impressions, or deformations present a pleasing appearance which is available in a wide selection of colors to blend with any decorative scheme.

Rugged construction allows normal handling of enclosures and elements. The heating element is constructed from seamless copper tubing and aluminum fins. Finned elements nest easily on the support cradles.

All elements can be used with any type of steam or hot water heating system for pressures up to 100 psig and temperatures up to 330 deg. F. with either manual or automatic controls.

More information? Circle Item 37, postcard, last page.

Teflon Pipe Thread Compound

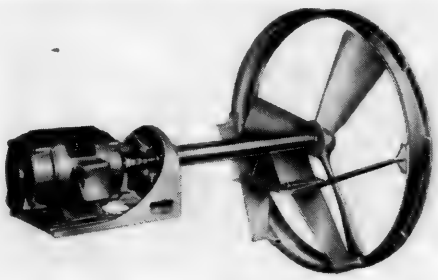
A thread sealing compound said to have excellent chemical and biological resistance is designated No. 25 Teflon Pipe Dope by its manufacturer, Abbott & Biddle Co., Philadelphia, Pa. It is recommended for use on chrome, chrome plate, nickel, steel, ceramic, and plastic pipe threads, and for joining dissimilar materials. Its lubricating qualities are said to prevent galled threads and to permit a joint that can be readily dismantled after long periods of exposure.

Tests in the company's lab on lines conveying strong acids, alkalies, and solvents, at temperatures between 150 and 500 deg F are said to indicate good sealing is achieved without application of maximum torque. Compound is at present furnished in 4-oz cans, at five dollars, for test purposes.

More information? Circle Item 38, postcard, last page.

Extension Shaft Fans

Type CE axial flow extension shaft fans designed for exhausting contaminated fumes from hoods, tanks, spray booths, and ovens, are announced by Propellair Div., Robbins & Myers, Inc., Springfield, Ohio.



For corrosive exhaust, special corrosion-resistant coatings for fan and extension tube are factory applied when specified. Fans are non-overloading and thus suitable for use over a wide operating range from free air to 1½ inches static pressure, the company states. The airfoil type propellers are cast from aluminum-magnesium alloy.

Available in 9 diameters to 60 inches, fans have PFMA-certified air deliveries to 79,000 cfm. Shaft lengths offered range from 16 to 66 inches.

More information? Circle Item 39, postcard, last page.

Pressure Tank for Water Systems

A pressure tank for water systems, offering high resistance to corrosion, is announced by The F. E. Myers & Bro. Co., Ashland, Ohio.

The heavy steel surface of the pressure tank is especially prepared and then coated with an epoxy plastic which is fire cured, the firm states. The result is a high gloss finish which will not chip, crack or peel. Both the inside and outside of the tank are treated.

The tank is offered in 21, 42, and 83-gal capacities in seven different models. The company reports that field tests have indicated the tank will successfully withstand highly corrosive water and will last considerably longer than standard galvanized tanks. Tanks may be painted on the job to match the pump or any decorating scheme.

More information? Circle Item 40, postcard, last page.

Unique Check Valve

The Harmeco Permatite check valve, available from Harman Equipment Co., Los Angeles, Calif., has a synthetic rubber element permanently molded to a threaded

nipple at the intake end of the valve. The other end of the rubber element does the checking, opening for flow in only one direction.

Due to the resiliency characteristic of synthetic rubber, this new check valve will produce reduced shock, the company states. The valve is suitable for any chemical that does not attack the synthetic. It may be added to any standard pipe fitting and may be used as a foot valve, a vertical or horizontal check valve, or as an angle valve in any suction or discharge line.

More information? Circle Item 41, postcard, last page.

Plastic Cement Bonds PVC Pipe

A plastic pipe compound, named PVC and developed for the permanent bonding of rigid polyvinyl chloride pipe sections and fittings, is announced by Schwartz Chemical Co. Inc., New York, N. Y.

Bonding agent is formulated from pure, unmodified polyvinyl chloride, so that the cemented joint is just as chemically resistant as the pipe itself.

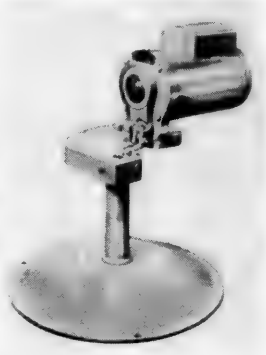
The viscous cement is easily applied by brush. Because of its high solids content, it can also be used effectively on loose fitting joints. The drying rate is slow enough, the company states, to allow its use on large diameter pipe and fittings. It is recommended for joining underground as well as exposed installations of the plastic pipe.

More information? Circle Item 42, postcard, last page.

Throatless Nibbling Shears

A column-mounted electric throatless nibbling shear, which operates at 1725 cutting strokes per minute, is introduced by Beverly Shear Mfg. Co., Chicago, Ill. It is designed for quick and accurate cutting, slitting and trimming.

Throatless design permits the work to be turned in any position so that any shape—curved, circular, irregular, angle, or straight—may be cut on the shear. Three models are available. The smallest, Model BN-1, has a cutting capacity of 14 gage in mild steel, 18 gage in stainless; Model BN-2 will cut up to 10 gage mild, 14 gage stainless; and the largest of the new shears, Model BN-3, will cut mild steel up to 3/16 inches, stainless steel to 10 gage.



Shears come complete with a standard 30-inch column and base which places the working table at bench height. A bench base (illustrated) with a 5½-inch column is available as an accessory. Mounted on either the long or short column, the nibbling shear may be swiveled in a full circle, permitting its use in confined areas. A locking screw is provided for locking the shear in any desired position on the column.

Nibblers are powered by heavy duty 60 cycle, 115/230 volt a-c motors designed to withstand the hardest usage, and are shipped with blades, ready for operation.

More information? Circle Item 43, postcard, last page.

Continuous Dewpoint Indicator

A portable dewpoint indicator which permits continuous dewpoint measurement over a wide temperature range has been developed by Weighing & Control Components, Inc., Hatboro, Pa.

Model W-C dewpoint indicator, unlike other devices presently available, does not require purging of the test

gas chamber each time a reading is to be taken. It is said to give accurate readings with very fast response over a dewpoint temperature range of —100 deg F to +110 deg.

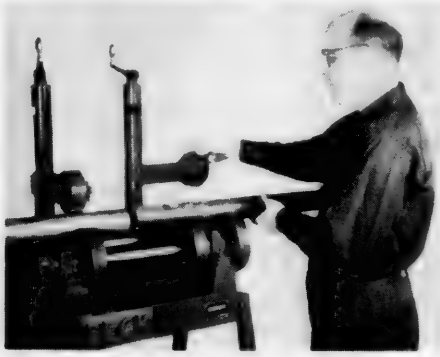
Since dewpoint temperature directly describes the moisture content of a gas, the indicator is a primary measurement instrument. Readings are expressed in degrees Fahrenheit, which may be converted to actual moisture content by means of a simple chart provided with each unit.

Compact and lightweight, the dewpoint indicator is powered by a self-contained battery. Gas connections are easily made with ⅛-inch pipe fittings.

More information? Circle Item 44, postcard, last page.

Rotator Speeds Welding

A pipe rotating machine that simplifies and speeds welding of pipe up to 5 inches dia has been developed by Cecil C. Peck Co., Cleveland, Ohio. The Peck Junior is said to be well suited to building site use for contract heating and plumbing where long pipe runs can be



conveniently pre-welded before erection. The unit also is useful in maintenance operations of industrial, food and chemical processing plants where power and process piping requires continuous attention.

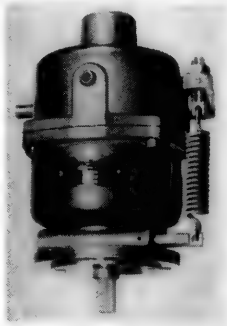
Pipe rotator is powered by a ¼-hp, capacitor-type, 110-v motor through an adjustable-speed V-belt transmission with 2-1 step-down gearing. Welding speed range of 7 to 14-inches per minute is obtained by adjusting the motor position.

More information? Circle Item 45, postcard, last page.

Flyball-Type Governor

Type 2300, a small, mechanical, flyball type of governor said to be capable of very accurate speed regulation, is marketed by Farris Pickering Governor Co., Inc., Palisades Park, N. J.

The governor is used extensively as the main speed control on small engines and is also used as an over-speed governor on larger engines. It is finding successful application on diesel and gasoline engines and on steam turbines in services which vary from pumps and compressors to electric generating sets. It is also used extensively for marine use and where service conditions require a variable speed governor.



Torque capacity is 30 inch-pounds at 1200 rpm. Constant speed range is 500 to 2400 rpm; variable speed range 500 to 1440 rpm. It can be supplied with a permanently attached flexible drive which has proven exceptionally efficient in absorbing cyclic speed variations, the company reports.

More information? Circle Item 46, postcard, last page.

Commercial Water Heater

A high-input copper core commercial water heater applicable to hotels, schools, apartment houses, etc., is introduced by Trageser Copper Works, Inc., New York International Airport, Jamaica, N. Y. Known as COM-65, it is a 65-gal unit with an input of 100,000 Btu per hr for all gases, recovering 84 gph at a rise of 100 deg F.

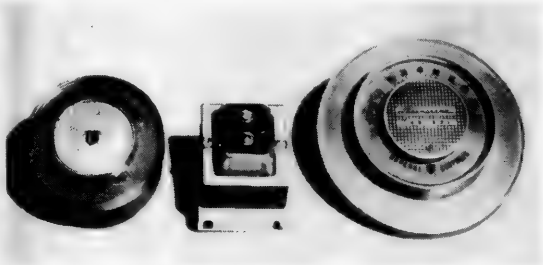
A solid copper tank is encased in a heavy steel shell which permits working pressures to 191 psig. There are no tubes that protrude into the tank, so that the hot gases surround the entire tank, as shown at right. Unit is insulated with glass fiber blanket.

With its high input and recovery, the heater eliminates the need for storage tanks, the company states. For large dwellings or wherever a large volume of hot water is required, two or more units can be connected in multiple. For laundries and dishwashing service, the heater can be fitted with a dual-temperature kit which enables it to provide water at 180 deg for sanitizing purposes.

More information? Circle Item 47, postcard, last page.

Thermal-Electric Control System

An economical system for regulating home warmth and comfort in advance of outside temperature changes has been developed by General Controls Co., Glendale, Calif.



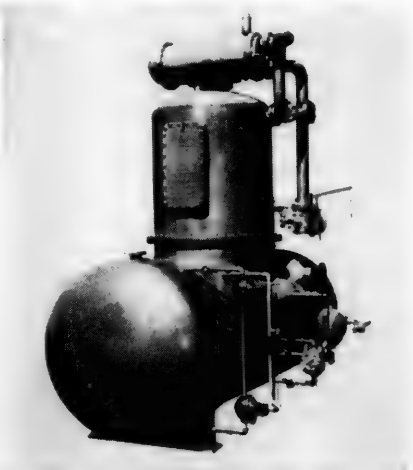
The system, called Thermoramic control, is a simple, thermal-electric, three-unit package that contains no moving or wearing parts and can be installed with any new automatic heating system. It requires no maintenance and is said to cost 300% less than electronic devices performing the same task up to now.

System's component parts are an outdoor thermostat that detects weather changes, an indoor thermostat that receives and relays furnace adjustment commands, and a 24-volt, 60-cycle transformer that supplies the operating electric current. Changes produced by weather in the flow of electric current through the outside sensing device affect a miniature thermostat heater that acts on the room thermostat which, in turn, sends orders for the heating system to go on or off.

More information? Circle Item 48, postcard, last page.

Dual Liquid Level Control

A dual liquid level control with high and low water alarms for its line of feedwater heaters is introduced by Stickle Steam Specialties Co., Indianapolis, Ind. Photo shows heater with control.



The control is recommended for installations where the primary supply for makeup water is subject to interruption. In the event feedwater in the storage section reaches a preset low, an alarm sounds and the control automatically switches on the secondary water supply. A different sounding alarm is actuated whenever a preset high point is reached in the storage section, so that the trouble can be corrected promptly.

The control is available on all of the company's deaerating and non deaerating feedwater heaters in the capacity range from 3,000 to 300,000 lb per hr, and with any desired storage capacity.

More information? Circle Item 49, postcard, last page.

Liquid Soap Dispenser

Model 24 liquid soap dispenser, announced by Bobrick Dispensers, Inc., Brooklyn, N. Y. (and Los Angeles, Calif.), utilizes company's Hydroflex mechanism with force

pump action with the result that there are no packings or washers to wear out. There are only three moving parts, the company states.

Container is molded of shatterproof, translucent Lustrex, a Monsanto plastic, and holds 1 pt, 2 fl. oz, the soap level always being visible. The locked, tamper-proof filler top is securely chained to a stainless steel hood.

More information? Circle Item 50, postcard, last page.

Impeller-less Submersible Pump

Manufactured by Peerless Pump Div., Food Machinery and Chemical Corp., Indianapolis, Ind., is the Dynaflo submersible pump. Based on a positive displacement design, the pump features an eccentric stainless steel rotor rotating in a concentric abrasion-resistant hard rubber stator. As the rotor turns, tightly sealed cavities are formed by the rotor-stator, and the liquid being pumped is "squeezed" up and out to discharge, much like the operation of a screw conveyor. Completely noiseless in operation, no line-shafting, rods, jets, impellers or other moving parts are employed.

During operation of the unit, well water both cools and lubricates the pump. There are no parts whatever that require oiling; the pump motor is lifetime lubricated. The rotor is flexibly coupled by vibration-eliminating rubber couplings to the 60-cycle single phase motor.

Pump is available in ½, ¾, 1, and 1½-hp. motor sizes, providing capacities to 1680 gph, pumping from depths to 400 ft. and pressures to 80 psi.

More information? Circle Item 51, postcard, last page.

Axial Roof Ventilators

A line of hooded and vertical axial roof ventilator air moving units engineered for economical exhaust ventilation for clean air supply is announced by The Trane Co., La Crosse, Wis. Primarily designed for industrial

application, the ventilators are especially suited for exhaust or supply service on warehouses, mills, factories and similar buildings with large, open interior areas.

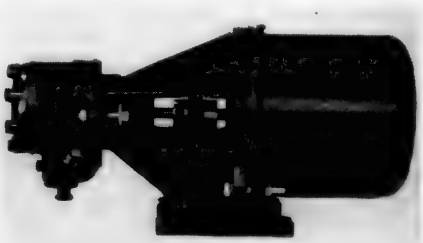
Three axial roof ventilator models are offered—a streamlined hooded unit for exhaust, a hooded unit for air supply, and a vertical exhaust unit for high velocity discharge of smoke, fume and gas-contaminated air. The hooded unit, as illustrated, provides an attractive, minimum-height silhouette and is designed to satisfy blackout requirements. Vertical exhaust units discharge impure air high above the roof to prevent re-entrance to the building or damage to the roof.

Each of the models is available with direct or belt-drive in five fan wheel diameter sizes ranging from 24 to 48 inches. Capacities range up to 43,200 cfm and static pressure up to ¾ inch.

More information? Circle Item 52, postcard, last page.

Boost Pump Assembly

A compact pump-motor-bracket assembly that provides a simplified means of supplying No. 2 or lighter fuel oil to one or more overhead heaters or furnaces is announced by Hydraulic Div., Sunstrand Machine Tool Co., Rockford, Ill. The boost pump assembly is offered with or



without motor and is intended to supply an auxiliary tank equipped with automatic oil level switch for control of boost pump motor operation.

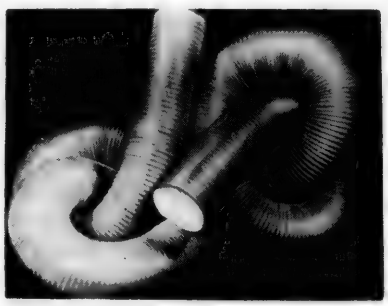
Either single- or two-stage pump assemblies are available. Model BJ-100-M includes the single-stage pump, while Model BH-100-M includes the two-stage pump. These models, when designated without motor, drop the "M" suffix. Either the Model J single-stage or Model H two-stage, incorporating a cutoff valve and strainer are used in the assembly. The cutoff valve acts as a check to prevent loss of supply head to auxiliary tank, thus assuring quick recovery following shutdown periods.

Delivery rate of the boost pump is 30 gph with No. 2 fuel oil. Installation costs are reduced with the boost pump by locating the auxiliary tank directly overhead to permit short and direct piping and wiring.

More information? Circle Item 53, postcard, last page.

Flexible Ducting

A new flexible ducting for air conditioning systems is announced by Flexible Tubing Corp., Guilford, Conn. The manufacturer emphasizes the low price of Thermaflex ST, and points out that this brings the advantages of flexible air conditioning ducting to a whole new field of users.



Ducting consists of a continuous vinyl-coated glass fiber cover, permanently fused to a vinyl-coated spring steel wire helix. The maker recommends it for use with either high or low pressure air-conditioning systems. It can be installed without special tools, and requires no elbows or special fittings.

The flexible ducting is waterproof, air-tight, and flameproof, and is said to offer almost twice the crush-resistance of any ducting in its price range. It is available in 16-ft lengths, and in diameters from 2 to 10 inches.

More information? Circle Item 54, postcard, last page.

Portable Electric Steam Cleaner

A portable electric steam cleaner, which operates on a minimum of water and is designed for working under conditions where it is impractical to use the larger steam cleaners, is available from Polaris Industries, Inc., Roseau, Minn., for maintenance, repair departments, service shops, and on-the-job service calls.

The unit operates on a "one fill" basis, without water connections, and requires only a 220-v electrical connection. After the boiler is filled with water there is nothing further to adjust or regulate. One filling of the boiler furnishes a supply of steam for approximately four hours of continual use. UL-listed safety features allows constant electrical hookup which assures a ready supply of steam for up to two days of intermittent use.

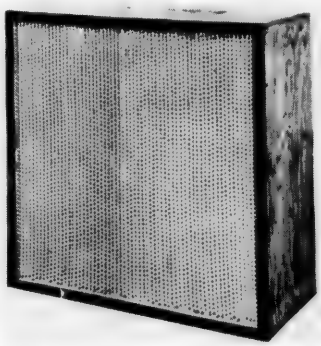
A separate detergent tank is contained within the cabinet; cleaning solutions are regulated and mixed with the steam at the nozzle tip. Following the cleaning operation, the detergent supply can be shut off and pure steam used for rinsing.

More information? Circle Item 55, postcard, last page.

Filter Efficiency Nears 100%

A superior filter medium for all series of Absolute filters is announced by Cambridge Filter Corp., Syracuse, N. Y. Medium consists of a combination of selected glass and asbestos fibers which are said to increase filter efficiency, capacity, and fire, temperature, and humidity resistance.

Minimum efficiency is now 99.97% based on removal of 0.3 micron (0.0000118-inch) dia particles, the company states. At the same time the rated capacity of its 24 x 24 x 11½-inch size at 1-inch w. g. resistance has



been increased to 1100 cfm. This increase in capacity permits additional savings in the reduced number of filters required for an installation as well as in the space required for the filter bank.

Incorporation of asbestos fibers is said to improve temperature resistance even as compared to the all-glass media sometimes employed in the past. Use of only inorganic fibers is to insure complete moisture and mildew resistance. Filters to withstand 1000 deg F and 100% relative humidity are available.

As shown in the illustration, filter construction is modified to increase the number of pleats and incorporate over 200 sq ft of filter media in the 24 x 24 x 11½-inch filter.

More information? Circle Item 56, postcard, last page.

Steam-to-Water Convertor

Development and production of a steam-to-water convertor unit, for conversion of steam heating to forced circulation hot water heating, is announced by Rowe A. Mauney, Marion, N. C. Called Steam-Hydro convertor, its chief advantage is that no accessory equipment, such as compression tank, cold water filling connection, pressure relief valve, or condensate pump, is needed in connection with it.

The convertor is most applicable where existing supply and return steam lines run overhead and it is desired to bring the heating medium down to the floor to supply finned radiation, for instance, and where it is desired that the steam trap remain at its original elevation so that condensate return to the boiler by gravity. The convertor and a hot water circulating pump are then mounted at the approximate level of the overhead steam supply and return lines. The steam main is dripped to the convertor. Radiation is under a pressure equal to the steam pressure plus the static head, convertor to floor unit.

The entire conversion is said to be very economical because of the few parts required and because trenching of water lines is eliminated, a particularly difficult job if slab construction is found.

Units are available in 50,000 Btu ($80), 250,000 Btu ($125) and in larger sizes. They are 6½ inches in diameter of varying lengths and stamped 125 psi steam working pressure.

More information? Circle Item 57, postcard, last page.

Motor Controls

Production of a line of 50-amp starters and contactors, specifically designed and engineered for commercial air conditioning and refrigeration applications, is announced by Arrow-Hart & Hegeman Electric Co., Hartford, Conn. Availability of these units now makes it possible for the company to offer a complete line of motor controls for every requirement.

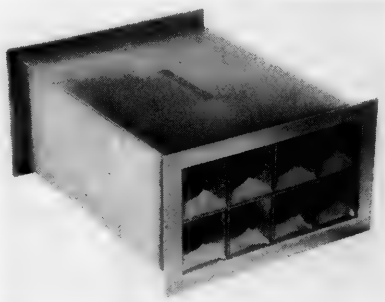
Units in this line are said to provide such features as smaller size and greater compactness, straight through wiring that eliminates looping and U-bending, rugged contacts, and extra wiring terminals for the convenient addition of pilot devices.

Designed for use with compressor motors, the 50-amp starters and contactors are rated at 300-amp interrupting capacity. Two, three, and four-pole models are available in the 50-amp size. Extra poles may be used for fan and damper motors without the need for extra, smaller relays. Either quick trip or standard heaters may be furnished to provide positive protection that compressors demand.

More information? Circle Item 58, postcard, last page.

Duct Silencers

Duct silencers which are lab tested to guarantee performance in heating and ventilating systems are announced by General Sound Control, Inc., Los Angeles,



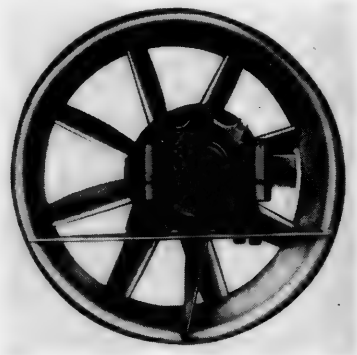
Calif. Called Acousti-Duct, they boast minimum pressure drop with maximum noise reduction.

Units are produced in varying duct lengths and in square and round cross-sections. Standard one-inch flanges are supplied unless a special style is requested. For corrosive atmospheres or extreme temperatures the ducts are constructed from special materials. Where a noise problem does not lend itself directly to a standard unit, the company's engineers will tailor a silencer system to specified needs.

More information? Circle Item 59, postcard, last page.

Industrial Ventilation Fan

The development of a direct-connected orifice ring fan, designed for industrial ventilation, drying, and smoke and fume removal, utilizes an aerodynamic blade design to produce a uniform air pattern.



Produced by Chicago Blower Corp., Franklin Park, Ill., this unit, Type DC, employs the airfoil design of the blade to produce a high pressure characteristic, yet maintain a low noise level. By also designing the hub to be in equal proportion to the wheel surface, dead spots or partial stalling are eliminated, the manufacturer reports.

Constructed of aluminum or steel, all blades are hollow, die-formed in one piece, and welded shut. Each of the 14 models, ranging in size from 12 to 72 inches, is available with 2, 4, 6 and 8 blades, depending upon pressure and volume specifications.

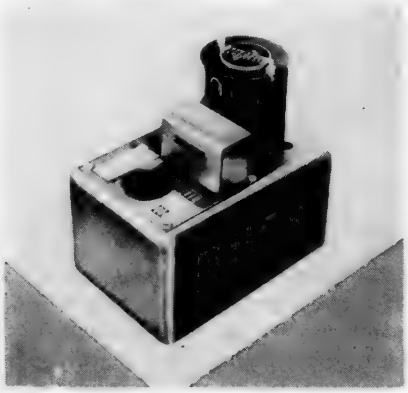
Standard motors operate in temperatures up to 120 deg F, while glass-insulated models can be supplied for operations ranging to 180 deg. All units are designed for horizontal or vertical installations.

More information? Circle Item 60, postcard, last page.

Condensate Disposal Pumps

Addition of two units to its line of condensate disposal pumps is announced by Hartell, Inc., Warminister, Pa.

Model M is for in-pan applications and is connected to compressor relay, defrost control, or fan. It is available for 115 or 230 volts with 10 or 20-ft pumping head.



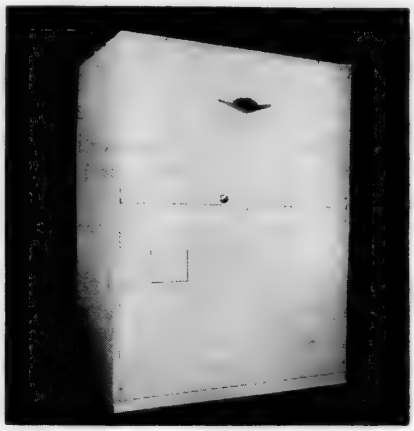
Models A (illustrated) and L are completely automatic disposal systems, designed specifically for the removal of water from air conditioning, refrigeration, and dehumidification installations where floor drains are not available. Model A is for general purpose applications in the domestic and small to medium commercial field. Model L is utilized primarily for large commercial and industrial air conditioning or refrigeration systems, and multiple draining applications.

Units are constructed with sand-cast, marine-type, aluminum reservoir and impeller, and integrally cast pump housing. Removal of a shipping wing-nut places the unit in operating position. Weight and linkage of the constant level devices are factory adjusted, simplifying installation and eliminating any possibility of field errors.

More information? Circle Item 61, postcard, last page.

Air-Cooled Liquid Chillers

Air-cooled liquid chillers, designated ACI-AA, of 3 to 15 hp rating which can be installed by hooking water and electrical connections, are announced by American Coils Co., Farmingdale, N. J. They can be used for air conditioning offices, motels, or homes, as well as for industry, and are installed indoors or outdoors.



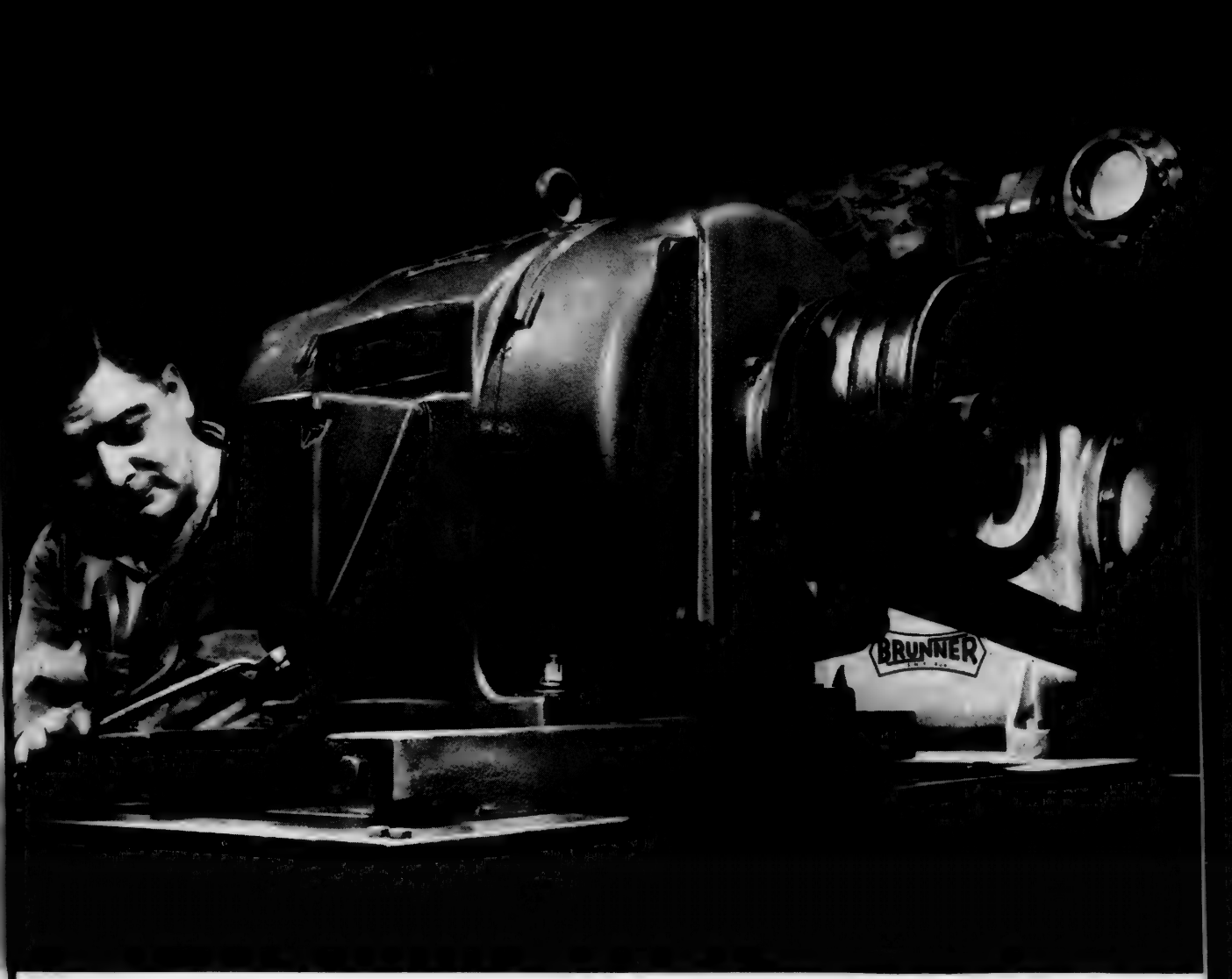
Installation time and costs are said to be reduced because no piping of refrigerant is required. System is preset and regulated at the factory for automatic operation.

A new honeycomb design heat exchanger with straight-through water passes is constructed of heavy Admiralty metal which allows it to be used with either fresh or salt water, the company states.

The chillers are designed to provide water or process fluids for applications where use of water for condensing is not practical. The air-cooled condenser has aluminum fin-tubes and connections are easily made for ductwork on inside installations. The entire package consists of an insulated chiller, built-in air-cooled condenser, large receiver and operating and protective controls. Five air-cooled models are offered. One refrigerant circuit is standard on units up to 7½ hp; two on units from 10 to 15 hp.

More information? Circle Item 62, postcard, last page.

(Concluded on page 124)



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FAST DELIVERY—Standard G-E motors—suitable for part-winding, reduced voltage, or full-voltage starting—are available from over 325 distributor and General Electric district warehouses throughout the country.

EASY INSTALLATION—New design makes all 1800-rpm and slower models ideal for use on multi-V-belt drive applications. All 1800-rpm motors have part-winding connection diagrams on nameplates, and all motors are factory lubricated. All-angle mounting and handling is possible with all Tri-Clad '55' motors through 125-hp.

FOR MORE INFORMATION on quiet running G-E motors and control for part-winding starting, call your nearby Apparatus Sales Office or distributor, or mail coupon for free bulletin. General Electric Co., Schenectady, N. Y.

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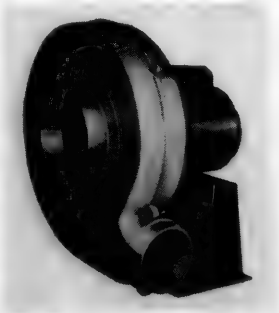
.....

(Concluded from page 122)

Industrial Utility Blower

A utility blower, featuring an aluminum housing and wheel, and designed for both air supply and exhaust use, is introduced by Cincinnati Fan & Ventilator Co., Cincinnati, Ohio. Designed specifically for OEM and industrial applications, the blower, known as Model PB, is available in 4 sizes and 4 discharge positions.



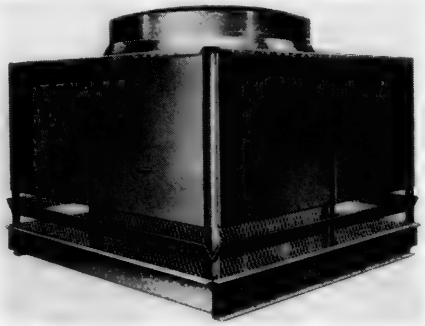
The model is fitted for direct motor drive with the fan housing attached to a flange-type motor which can be used with or without motor pedestal to conserve space. The intake side of the blower is provided with a pad which permits flush mounting in horizontal or vertical position.

Blower is said to be well suited for industrial process work, and exhaust from wood and metal working machinery. The self-cleaning cast aluminum wheel lets the blower handle difficult materials such as lint, paper, and shavings. Other suggested uses include exhausting fumes and smoke, supplying air to burners and furnaces, and cooling electronic and other equipment.

More information? Circle Item 63, postcard, last page.

Low-Design Cooling Towers

Production of a line of packaged cooling towers in the 5 to 150-ton capacity range is announced by Dover Mfg. Co., Independence, Mo. Named the Sil-low-ette, the unit is designed to hug the roofline in rooftop installations.



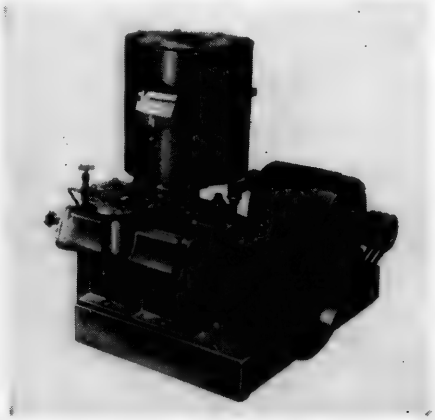
Each of these counter-flow, mechanically induced draft towers with propeller fan and vertical air discharge has colored side panels available in white or colored transite as well as in galvanized steel. Translucent side panels are available and permit interior lighting of the tower for display purposes. Side panels are removed by lifting up and out (no bolts or screws to unfasten) to expose interior of the tower.

Other tower features include separate air and grease lines which run from the bearing housing to the outside of the tower; and a right-angle utility sump that protects pumping equipment from debris and air pockets.

More information? Circle Item 64, postcard, last page.

High Vacuum Pumps

Two single-stage mechanical high vacuum pumps designated as KDH-65 and KDH-80 are added to its line by Kinney Mfg. Div., The New York Air Brake Company, Boston, Mass. Both pumps are of duplex design and both are gas ballasted.

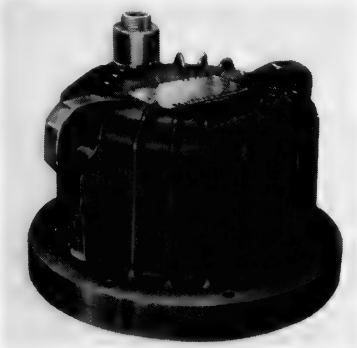


Engineering of these pumps provides an opportunity to bracket two capacities in a single model through the use of higher speed and increased horsepower in the motor for the larger capacity unit. The KDH-65 uses a 3-hp, 1800-rpm motor. The KDH-80 is driven by a 5-hp, 1800-rpm motor. According to the manufacturer, this provides an element of versatility of significant benefit to users of pumps in this range.

More information? Circle Item 65, postcard, last page.

Submersible Motors

A complete line of submersible a-c motors for direct coupling to pumps which must operate continuously while submerged in oil, water, or liquid chemicals is introduced by Reliance Electric and Engineering Co., Cleveland, Ohio.



The polyphase, single-voltage submersible motors are available in sizes from ¾ through 15 hp. The special universal mounting flange is designed for direct connection to most standard pumps; modifications can be made to meet special dimensional requirements.

The motor base is said to be precision-machined for true concentricity of shaft, providing easy, vibrationless close-coupling to the pump impeller with no painstaking alignment.

More information? Circle Item 66, postcard, last page.

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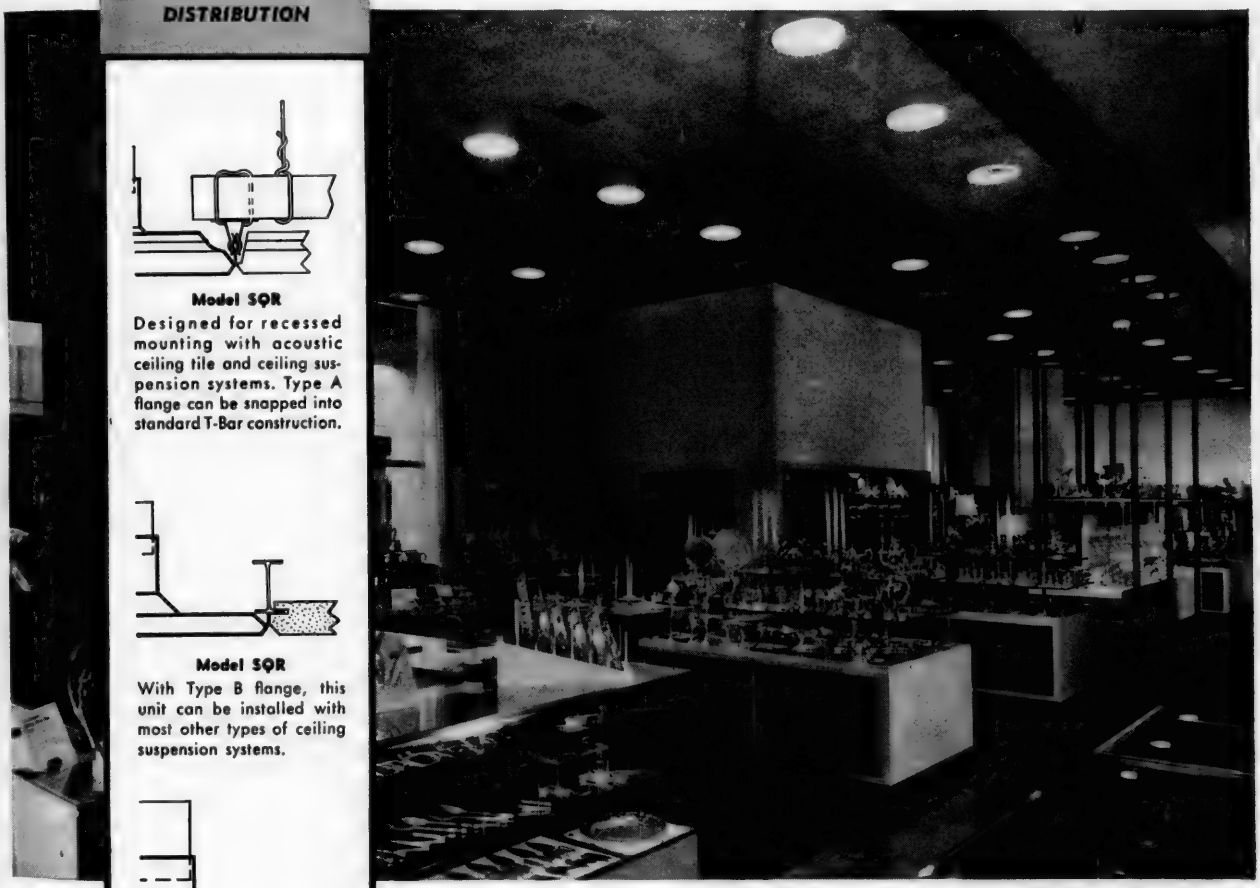
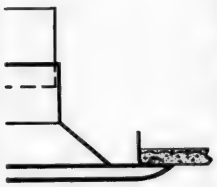


Model SQR

Designed for recessed mounting with acoustic ceiling tile and ceiling suspension systems. Type A flange can be snapped into standard T-Bar construction.

Model SQR

With Type B flange, this unit can be installed with most other types of ceiling suspension systems.



Model SQS

Provides a one-inch flange to cover opening irregularities — can be used with any type of ceiling.

Designed for optimum performance while remaining unobtrusive, Uni-Flo Square and Rectangular Ceiling Diffusers provide rapid diffusion at low sound level. Draft-free delivery guaranteed when used in accordance with published data. Ceiling smudge minimized. Contact your nearby Barber-Colman field office or write for Catalog F 6597-1. For best results, specify combined Air Distribution and Automatic Controls by Barber-Colman.

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NEWS OF THE MONTH

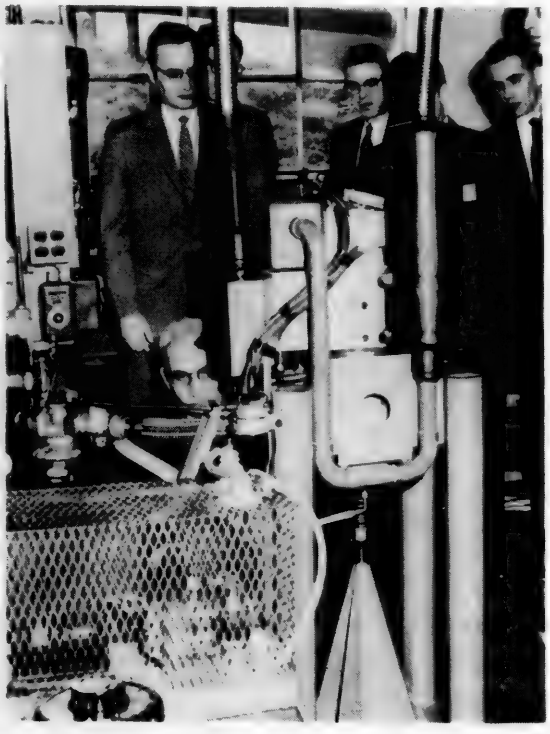
BTU RATINGS

for room air conditioners issued by ARI. No reference made to horsepower. Electrical data added.

Air-Conditioning and Refrigeration Institute, Washington, D. C., released a first list of room air-conditioner ratings for 1958, based on the reports of 24 manufacturers and stated in terms of Btu's per hr of cooling capacity.

The 1958 ratings make no reference to "horsepower," which formerly was used to designate size of room coolers. This term has been discarded as non-applicable to cooling capacity, and the manufacturers have agreed to use the Btu ratings as the primary measure of capacity, ARI states.

Ratings listed in the new publication, and in subsequent 1958 revisions of the rating list, have been established in accordance with ARI Standard 110-58. Unlike last year's list, which specified only Btu ratings of units, the 1958 list includes the total watts input, nameplate volts and amperage, cycle and phase of motors and the refrigerant number.



Shown inspecting an experimental air conditioning unit at Battelle Memorial Institute, Columbus, Ohio, are manufacturers' representatives there on the invitation of American Gas Association, sponsors of the research and development program that resulted in this 3-ton residential unit that operates on the free-piston principle and is powered by natural gas. Its application is said to promise important fuel savings and efficiency in residential air conditioning equipment.

HEAT PUMP

will serve 4-building group of power company in Spokane, Wash. to provide year-round comfort.

A heat pump system is being installed in the new Central Operating Facilities for the Washington Water Power Company at Spokane, Wash. The new facilities of the power firm will consist of four main buildings—a service building housing stores, a maintenance and repair garage, an auditorium-cafeteria, and a general office building.

Unique among the new features of the utility's four building operation will be the heat pump method of providing year around comfort.

Principal cooling and heating equipment will be two automatic-operating hermetically-sealed Trane centrifugal refrigeration units. The CenTraVac units will supply the buildings with 815 tons of refrigeration and will work in conjunction with an oil-fired boiler to handle peak heating loads occurring when outside temperature falls below a plus 30 deg.

The unit illustrated on the cover has a rating of 285 tons. The other unit, which is being installed, has a rating of 530 tons.

• **DESIGN CONDITIONS**—Because the design heating load in the Spokane area is considerably higher than the cooling load, the refrigeration capacity was based on cooling load so that the heat pump would run at peak efficiency for the longest period of time.

Heating and cooling source for the combination system is a deep well which takes water from an underground river. Temperature of the water varies only three degrees throughout the year, ranging from 49 to 52 degrees.

The CenTraVac compressor units are both full modulating and operate in sequence at higher loads. Due to design simplicity and completely automatic controls, the centrifugals will run unattended, with the exception of periodic routine inspections.

CONTROLS CONFERENCE

takes place at ASHAE Research Laboratory on the fourteenth. Meeting is open to those interested.

An All-Industry Conference on Control, arranged by the American Society of Heating and Air-Conditioning Engineers, will take place at the ASHAE Research Laboratory, Cleveland, Ohio, May 14, 1958. Purpose of the meeting is to consider problems of control as applied to the air-conditioning industry in the broad sense of controlability; particularly as related to system controlability characteristics and responses. These problems are of significance to designers, contractors, consultants, users, as well as the equipment and control manufacturing industry as a whole, the Society states.

The morning session will be carried forward by a panel of six engineers, each presenting the position of his segment of the industry, and each presentation will be followed by open discussion from the full panel. The after-

noon session will continue with panel discussions, and comments from those in attendance will also be invited.

• **GROUP VIEWPOINTS**—Panel speakers will consider group viewpoints such as those of the heat-exchanger manufacturer, the distribution-system supplier, the control manufacturer, the design-engineer or consultant, the contractor and user, and finally the position of the Society as a coordinating agency for unbiased research and dissemination of knowledge.

It is believed that the conference will clearly delineate the current status of control and will point out directions of progress and research needs. The meeting will be open to all who are seriously interested in the various aspects of this broad problem.

Serving with H. W. Alyea, chairman of the coordinating committee, are E. F. Snyder, Jr., vice chairman, Minneapolis, Minn., W. P. Chapman, Milwaukee, Wis., Walter A. Grant, Syracuse, N. Y., C. A. Gustafson, Skokie, Ill., John W. James, Chicago, Ill., H. A. Lockhart, Morton Grove, Ill., W. G. Young, Rockford, Ill., and (ex officio), B. H. Jennings, director of research, Cleveland, Ohio.

51ST ANNUAL MEETING

of Air Pollution Control Association to be held this month. More than 50 technical papers ready.

The city of Philadelphia will be host to the 51st Annual Meeting of the Air Pollution Control Association, May 25-29. Headquarters will be in the new Hotel Sheraton located in the heart of the city's recently constructed Penn Center. An interesting, comprehensive program is planned for visitors and their wives.

More than fifty technical papers on a variety of timely subjects, ranging from specific industrial applications and incineration techniques to automotive exhaust problems and the public relations aspects of effective air pollution control administration are prepared.

Entertainment for the ladies includes visits to Independence Hall and Valley Forge, and a luncheon trip to picturesque New Hope in nearby Bucks County.

Entertainment for the men will include a river trip on the Delaware (with the ladies) and one or two visits to interesting plants in the area, such as the new Tidewater Oil refinery.

SOLAR REFRIGERATOR

developed in Israel connects by pipe to collector on roof of residence. Looks like conventional unit.

A refrigerator using sunshine as its sole source of power has been developed by two engineers on the faculty of Technion-Israel Institute of Technology in Haifa. In place of the conventional electric or gas driven motor the device is connected by a pipe to a radiation-collector installed on the home owner's roof.

The co-inventors are Kurt Doron Ofer, of the Faculty of Chemical Technology, and J. Giladi, Head of the Division of Industrial Chemistry in the same Faculty. A

Your ideas work better when you work with HONEYWELL

The following pages bring you the latest developments in automatic controls from Honeywell. They widen your choice of products, give you more to work with.

For complete information on these new control products and systems, call your nearest Honeywell sales office. Honeywell provides 112 offices throughout the country; each is staffed with capable control specialists to assist you in preparing proposals and writing specifications.

Look over these new products and systems. And, remember, they are backed by the kind of support only Honeywell can offer you.

FOR MORE TO WORK WITH ... WORK WITH HONEYWELL

patent has been granted to the inventors for the device and a pilot model is undergoing final laboratory tests.

• **OPERATING COST LOW**—Outwardly there will be nothing to distinguish the solar refrigerator from an ordinary electric or gas refrigerator. It will be fitted with a freezer and thermostat, and will be able to maintain ranges of temperature similar to those produced by electricity. After initial installation of the solar-collector on the roof of the structure in which the refrigerator will be kept, there will be virtually no further operating costs for the refrigerator.

BIG SYSTEM GROWTH

outstrips other segments of air-conditioning industry with sales near $600 million during 1957.

Big systems, which gave most Americans their first taste of air-conditioning, and which will account for the largest share of the industry's sales, showed a bigger gain in 1957 than any other segment of the industry, it was reported this week by Air-Conditioning and Refrigeration Institute, Washington, D.C., following a meeting of ARI's Air-Conditioning and Refrigeration Systems Section.

At the same time, it was pointed out that the installation of large systems has as great a potential as any other segment of the industry, and possibly greater in some fields.

Installed cost of central station air-conditioning systems which went into operation in large multi-room buildings, and commercial and industrial applications in the U.S. during 1957 was estimated by the Section to be $598,900,000, as compared with a revised figure of $528,180,000 for 1956, and $434,120,000 for 1955. The gain for 1957 over 1956 represents almost 15%.

One thousandth "School of Living Comfort" diploma is awarded to D. F. Barnes, Omaha, Neb., by E. J. Gossett, chairman of the board, Bell & Gossett Co., Morton Grove, Ill. First formal course was given in 1954. Classes are taken through the design and layout of monoflo, two-pipe reverse return, series loop, radiant panel, snow melting, and chilled water systems in a step-by-step manner.

In a restaurant application, the Honeywell "Renew-Air" Filter has high absorption capacity for such objectionable odors as tobacco smoke, burning fat, fish and others likely to be present. In the past, increased outdoor air intake was necessary to diffuse these odors, which resulted in higher air conditioning costs. Now Honeywell's "Renew-Air" Filter removes the odors, enables air conditioning to be operated economically with reduced air intake.

Manufacturers who make up the Systems Section, representing more than 95% of all production of this type of equipment in the country, estimate that about half of last year's volume was installed in multi-room buildings —offices, etc.—and that the other half is about equally divided between commercial and industrial installations.

PELLETIZED FUEL

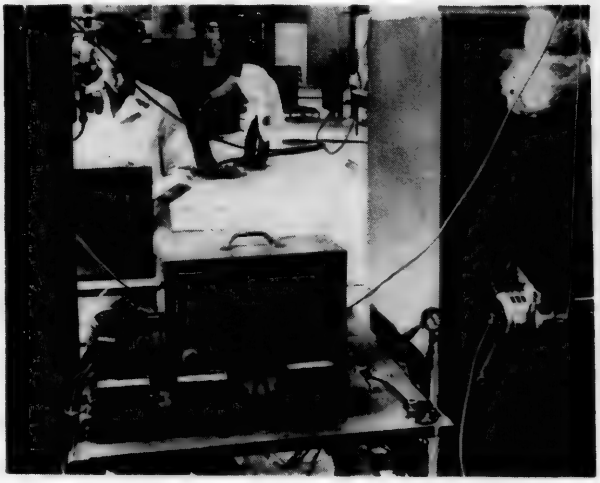
can be made from fine sizes of lignite, Bureau of Mines says. Pellets burn well, stand up in storage.

A satisfactory pelletized fuel can be developed from fine sizes of lignite now being stockpiled in the Midwest for lack of market, the Bureau of Mines reported.

The Bureau based its conclusion on tests conducted at its lignite experiment station, Grand Forks, N. Dak., showing that smaller pieces of lignite, when properly dried, can be mixed with a binder and formed into pellets which not only burn well, but can be stored and handled without disintegrating.

A wide range of tests in removing most of the moisture from the lignite in a rotary drum dryer and in using various binders was undertaken by Bureau researchers at Grand Forks. The best drying temperature was about 600 deg F and the most satisfactory binder was briquetting asphalt, they said.

Mixing of the binder and the particles of dried lignite took place in a rotating drum pelletizer. Some of the experiments used starch as a binding agent, but the resulting pellets were more friable.



A new area of the expanded research and testing laboratory of The Trane Co., La Crosse, Wis., is devoted to testing residential cooling and heating equipment. Completion of the lab, called the House of Weather Magic, was announced by the company. Equipment of the new residential testing facility measures heat output, cooling capacity, burner efficiency, combustion, and effectiveness of insulations.

A Bureau report describing the Grand Forks research says the lignite pellets formed with asphalt binders appear to burn best in thin firebeds, such as those on traveling grate stokers.

For your mechanical systems . . .
Honeywell's "Renew-Air" Filters

reduce size of cooling equipment needed, pay for themselves before installation

In restaurants, stores, hotels, office buildings, Honeywell "Renew-Air" Filters can save your clients money. By reducing the amount of outdoor air intake normally required to diffuse internal odors, "Renew-Air" Filters enable you to specify smaller cooling equipment, give your clients efficient air conditioning at a lower initial cost. Savings more than pay for the cost of the Honeywell "Renew-Air" Filters themselves. In addition, client's operating costs are lowered.

And, combined with the Honeywell Electronic Air Cleaner, "Renew-Air" Filters are even more efficient. Their activated charcoal lasts and lasts because no oily smoke or film gets through to clog up the charcoal's pores. There's a bonus with the Honeywell Electronic Air Cleaner, too. It reduces cleaning and decorating costs for owners because it removes dirt particles in the air six times more effectively than ordinary filters.

"Renew-Air" Filters are available in four different sizes and types of cells, easily removable from the frame for re-activation. The Honeywell Electronic Air Cleaner is sold in "building block" modules adaptable to any installation. Call your local Honeywell office for more details.

Honeywell
First in Controls

NEW HARVARD DIVISION

will tackle radiation hazards, air pollution, and industrial hygiene. Dr. Whittenberger is appointed.

Dr. James L. Whittenberger, an authority in the physiology of respiration, has been named the first James Stevens Simmons Professor of Public Health in the Harvard University School of Public Health. Formation of a new Division of Environmental Hygiene in the School, with Dr. Whittenberger as Director, was also disclosed. The division will bring together research and teaching activities of specialists in the fields of radiation hazards, air pollution, accident prevention, and industrial hygiene. The division will work in close consultation with the Laboratories of Sanitary Engineering in Cambridge.

AIR POLLUTION COURSE

emphasizes methods of appraisal and engineering control. Three special courses are also offered.

Student candidates for a new course in air pollution control at the Graduate School of Public Health of the University of Pittsburgh are now being considered for admission to the 1958-59 academic program. The course leading to the degree of Master of Science in Hygiene is open to engineers and others with the bachelor's degree in the physical sciences having a mathematical background, the University announced.

The nine-month long course, placing emphasis on methods of appraisal and on engineering control of air pollution, has been under development during the past year by a team composed of Wesley C. Hemeon, director, Hemeon Associates, air pollution research engineers; Lee Schreibeis, chief, Division of Air Pollution Control, Allegheny County Health Department; and M. A. Shapiro, associate professor of sanitary engineering, Graduate School of Public Health, University of Pittsburgh. They will be supplemented by specialist visiting lecturers in certain phases of the instruction.

• **THREE SPECIAL COURSES**—In addition to a number of important background courses already in operation in the School, three special courses in air pollution have been designed as a core of instruction in this field. One of these courses is offered during the first semester and the other two during the second semester.

Air Pollution Principles—a lecture course concerned with all aspects of the subject and solution of engineering problems related to air pollution control.

Air Pollution Measurements—a lecture and laboratory course aimed to instruct and provide practice both in outdoor measurements and in stack gas and other source measurements—for the determination of particulate matter, significant gases and odors.

Air Pollution Practice—field and laboratory practice in methods for and design of air pollution investigations, both at the source and in the community. It will also include studies of the characteristics of various types of

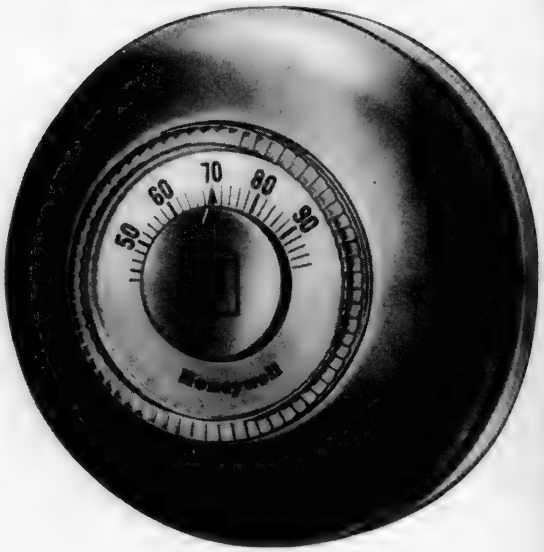
For your mechanical systems

Now, a Honeywell Pneumatic Round Thermostat for every installation, every function!

Now Honeywell offers models of the famous Pneumatic Round Thermostat for every application—summer-winter, day-night, modulating, two-position, and submaster.

All versions provide the accuracy, fast-response and dependability of the Honeywell Pneumatic Round, the only new pneumatic thermostat in the industry. And all models feature the world's most popular round thermostat styling.

Simplified design and a complete line of installation fittings make these thermostats easy to install and maintain. Pleasingly styled, tamper-proof guards are available where needed.



Honeywell

First in Controls

gas cleaning equipment. Particular attention will be given to the combustion of fuels and incineration of wastes.

Graduates of this course of training are expected to have acquired basic abilities for independent operation and administration of air pollution activities for industry and for governmental agencies. Inquiries should be directed to M. A. Shapiro, Associate Professor of Sanitary Engineering, Graduate School of Public Health, University of Pittsburgh, Pittsburgh 13, Pa.

25 BILLION KWH

generated and transmitted as a subordinate activity of Bureau of Reclamation grossed $60 billion.

Although generation and transmission of electricity is a subordinate facet of the Bureau of Reclamation's water source development, it is big business, it was reported at the Middle Eastern District meeting of the American Institute of Electrical Engineers.

Generation and transmission of this power in 17 western states and Alaska amounted to 25 billion kilowatt hours that grossed $60,153,474 in 1957. Problems were posed that were probably not encountered by any other single utility company, said Bureau member D. S. Campbell in a paper "Design and Operation of Reclamation's Power Systems." For instance, on its 9,855 circuit miles of transmission lines, elevations range from sea level in California to 11,400 ft in Colorado; temperatures vary from 120 to 130 deg F in southwestern Arizona to winter lows of —40 deg in Montana and North Dakota.

NUCLEAR HEATING

for industry using small reactors has definite market potential, Atomic Energy Conference hears.

An extensive market potential exists in the field of space and process heating for industrial usage, according to Charles M. Rice, manager, Reactor Engineering Department, American-Standard Atomic Energy Division. In a session of the Atomic Energy Management Conference, co-sponsored by the Atomic Industrial Forums and the National Industrial Conference Board, on "the economic feasibility of small reactor units," Mr. Rice said that potential applications extend to district, military and institutional space heating and to combination plants developing power or low-pressure steam in conjunction with special purposes. He also stated that this market can utilize reactors of 10 to 100 thermal megawatts which can generate steam and high temperature water in the range from 250 to 600 psi.

• **OPERATION BY 1960**—Mr. Rice's paper discussed a 20 thermal MW boiling water design which utilizes aluminum fuel elements and operates at 450 deg F to produce process water or steam at 400 deg. Such a reactor could be in operation by 1960.

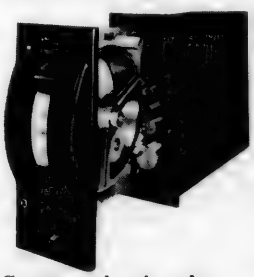
Unlimited remote temperature readings on one Honeywell Electronik* indicator

Scale shown full size. Twin hairline index prevents parallax errors.

With this new, compact indicator, the operating engineer can read temperatures at any point in an air conditioning system simply by pressing a button.

And he gets the most accurate readings known. Honeywell's indicator is accurate to plus or minus 1/5 of a degree because it's electronically precise and its rotating vertical scale—over 28 inches long—gives more than twice the indication area of ordinary circular indicators.

Private offices, zones on each floor, outside air, chilled or hot water lines all can be checked instantly on this one instrument in less than a square foot of panel space. Since sensing elements for the indicator are located right in the thermostat, connected to the indicator by low voltage wiring, there's no need for dual installation.



Compact chassis only 6½" wide. Slides out for inspection without stopping operation of indicator. *Trademark

At little extra cost, a Honeywell Systems Analyzer can be added when desired. Using the same wiring and sensing elements as the indicator, it records, on a 12-inch wide strip chart, the readings for any point or combination of points, provides a permanent record.

Honeywell

First in Controls

DEGREE-DAYS FOR MARCH, 1958

(A) Airport readings; (C) City office readings; (O) Readings at a point on outskirts of city

AIR CONDITIONING, HEATING AND VENTILATING's 30th Year of Publication of Monthly Degree-Day Data

City	March			Season to Mar. 31, incl., from Sept. 1		
	1958	1957	Normal	1957-58	1956-57	Normal
Abilene, Texas (A)	544	333	344	2876	2218	2594
Albany, New York (A)	892	908	989	5775	5966	6045
Albuquerque, New Mexico (A)	679	343	589	4018	3572	4030
Alpena, Michigan (C)	1007	1118	1156	6399	6529	6604
Asheville, North Carolina (C)	679	601	572	4368	3226	3677
Atlanta, Georgia (A)	461	410	404	3156	2100	2673
Atlantic City, New Jersey (C)	758	701	729	4115	3826	4060
Augusta, Georgia (A)	414	348	308	2809	1813	2076
Baltimore, Maryland (C)	635	566	611	3782	3431	3804
Billings, Montana (A)	962	936	958	5531	6087	6091
Binghamton, New York (C)	954	883	927	5673	5395	5662
Birmingham, Alabama (A)	462	402	378	3117	2035	2630
Bismarck, North Dakota (A)	1123	1145	1187	7220	7708	7839
Block Island, Rhode Island (A)	860	812	865	4480	4575	4782
Boise, Idaho (A)	745	700	719	4734	5381	5096
Boston, Massachusetts (A)	796	788	849	4613	4881	4972
Buffalo, New York (A)	940	894	992	5656	5358	5769
Burlington, Iowa (A)	874	841	822	5710	5223	5463
Burlington, Vermont (A)	994	1035	1107	6382	6577	6739
Cairo, Illinois (C)	682	511	523	3930	3219	3527
Charleston, South Carolina (C)	359	276	260	2254	1388	1726
Charlotte, North Carolina (A)	559	442	449	3429	2452	3004
Chattanooga, Tennessee (A)	570	475	467	3685	2602	3160
Cheyenne, Wyoming (A)	1218	976	1029	5999	5738	6138
Chicago, Illinois (C)[b]	890	846	868	5498	(a)	5516
Cincinnati, Ohio (C)	760	608	645	4370	3633	4110
Cleveland, Ohio (A)	907	825	874	5255	4861	5196
Columbia, Missouri (A)	859	701	698	4902	4070	4632
Columbia, South Carolina (A)	463	350	318	2893	1887	2207
Columbus, Ohio (C)	817	738	741	4932	4308	4694
Concord, New Hampshire (A)	900	942	1029	5793	6420	6486
Concordia, Kansas (C)	971	735	725	5080	4627	4816
Dallas, Texas (A)	470	347	288	2476	2088	2197
Dayton, Ohio (A)	893	775	781	5276	4635	4938
Denver, Colorado (A)	990	795	843	4922	4750	5240
Des Moines, Iowa (A)	933	867	868	5969	5520	5745
Detroit, Michigan (A)	883	867	927	5465	5237	5527
Devils Lake, North Dakota (C)	1150	1248	1314	7839	8405	8551
Dodge City, Kansas (A)	1027	749	694	4807	4375	4561
Dubuque, Iowa (A)	978	974	983	6445	6130	6349
Duluth, Minnesota (C)	1137	1292	1252	7753	8256	7929
Elkins, West Virginia (A)	932	762	797	5575	4578	4979
El Paso, Texas (A)	422	242	330	2642	2108	2531
Ely, Nevada (A)	1068	893	921	6125	6097	6120
Escanaba, Michigan (C)	1041	1161	1203	6698	6958	7059
Evansville, Indiana (A)	785	623	589	4578	3845	4013
Fargo, North Dakota (A)	1049	1159	1231	7249	7774	8082
Fort Smith, Arkansas (A)	614	479	418	3391	2860	3037
Fort Wayne, Indiana (A)	913	859	874	5620	5201	5475
Fort Worth, Texas (A)	496	381	308	2659	2214	2266
Fresno, California (A)	402	308	304	2348	2430	2344
Galveston, Texas (C)	220	104	176	1369	715	1181
Grand Junction, Colorado (A)	761	670	738	4819	5292	5226
Grand Rapids, Michigan (A)	929	932	1008	6005	5608	6041
Green Bay, Wisconsin (A)	1034	1078	1132	6828	6937	7019
Greensboro, North Carolina (A)	675	547	528	4020	3162	3519
Greenville, South Carolina (A)	563	451	442	3445	2510	2867
Harrisburg, Pennsylvania (A)	815	730	750	4850	4512	4693
Hartford, Connecticut (A)	823	822	871	5204	5452	5365
Hatteras, North Carolina (C)	(a)	(a)	394	(a)	(a)	2196
Havre, Montana (C)	1227	1006	1076	6516	7100	7120
Helena, Montana (A)	1073	1013	1017	6291	7013	6952
Houston, Texas (C)	221	118	166	1475	854	1249
Huron, South Dakota (A)	1112	1045	1032	6546	6782	6959
Indianapolis, Indiana (A)	897	742	772	5297	4581	4973
Jackson, Mississippi (A)	429	327	299	2734	1764	2121
Kansas City, Missouri (A)	828	649	666	4666	4151	4477
Knoxville, Tennessee (A)	586	496	500	3771	2694	3344
La Crosse, Wisconsin (A)	973	1000	1035	6477	6332	6743
Lander, Wyoming (A)	1098	924	1045	6401	6269	7027
Lewiston, Maine (O)	919	960	1093	5875	6417	6625

(a) Data not available. [b] 1957 and normal figures are for Midway Airport; 1956 figures are for Grant Park Station.

Normal figures in this table are based on 30-year period covering 1921 to 1950, inclusive, as compiled and published by the U. S. Weather Bureau.

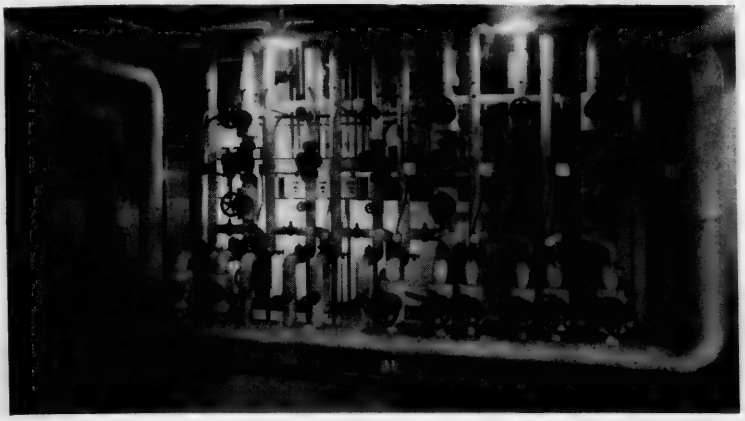
Figures in this table, with two exceptions, based on local weather bureau reports. Exceptions are Utica and Lewiston, figures for which are furnished through the courtesy of Coke Sales Department, Central New York Power Corp., Utica, N. Y., and Norman E. Ross, Bursar, Bates College, Lewiston, Me., respectively. [Table concluded on page 134]

Notre Dame Hospital, Manchester, New Hampshire

WHERE *QUIET* VIBRATIONLESS OPERATION IS ALL-ESSENTIAL—

B&G PUMPS

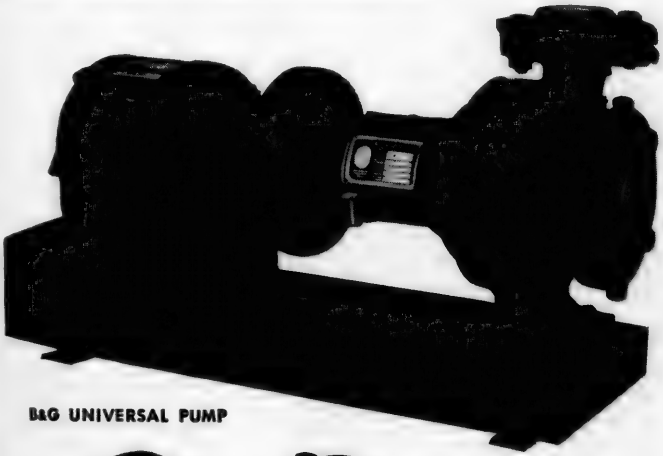
ARE THE PREFERRED UNITS



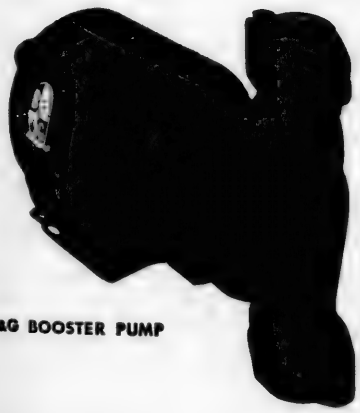
Secondary heating circuits are circulated by this battery of B&G Booster Pumps.

The piping of the primary circuit does not leave the apparatus room and is circulated by B&G Universal Pumps.

Architect: Leo P. Provost, A.I.A., Manchester, N. H.
Engineer: Romeo P. Morin, P.E., Manchester, N. H.
General Contractor: Harvey Construction Co., Inc., Manchester, N. H.
Heating Contractor: R. C. Peabody, Inc., Manchester, N. H.



B&G UNIVERSAL PUMP



B&G BOOSTER PUMP

This installation illustrates two important factors in the design of a satisfactory forced hot water heating system.

First, it employs primary and secondary pumping—a design arrangement developed by B&G for more accurate control of temperatures. As shown in the photos, B&G Universal Pumps circulate the primary mains and B&G Boosters circulate the secondary circuits supplying seven zones.

Second, the B&G pumps selected are noted for *quiet* operation—an all-important consideration. Transmission of pump noise through the piping system can penalize the most careful designing and installation.

B&G Booster and Universal Pumps are engineered and built to meet the exacting demands of water heating and cooling systems. These are not run-of-mine centrifugal pumps...they are distinguished by numerous features which assure *silent, vibrationless* operation. Among these are specially built, more costly motors, tested for quietness—oversized shafts of hardened alloy steel—long sleeve bearings—noise dampening spring couplers—oil lubrication and leak-proof mechanical seals.

That's why B&G Circulating Pumps are *preferred*...they're *quiet where silence counts!*

Hydro-Flo SYSTEM

Reg. U.S. Pat. Off.

BELL & GOSSETT

COMPANY

Dept. FG-5, Morton Grove, Ill.

Canadian Licensee: S.A. Armstrong, Ltd., 1400 O'Connor Drive, Toronto 16, Ontario

Degree-Day for March, 1958 (Concluded)

(A) Airport readings; (C) City office readings; (O) Readings at a point on outskirts of city

AIR CONDITIONING, HEATING AND VENTILATING'S 30th Year of Publication of Monthly Degree-Day Data

City	March			Season to Mar. 31, incl., from Sept. 1		
	1958	1957	Normal	1957-58	1956-57	Normal
Lincoln, Nebraska (C)	918	793	794	5324	4902	5277
Little Rock, Arkansas (A)	562	427	401	3069	2567	2842
Los Angeles, California (C)	246	123	212	795	808	1235
Louisville, Kentucky (A)	754	618	611	4421	3720	4055
Lynchburg, Virginia (A)	730	569	584	4275	3501	3777
Macon, Georgia (A)	345	300	275	2511	1603	1987
Madison, Wisconsin (A)	955	977	1011	6411	6133	6342
Marquette, Michigan (C)	1070	1192	1181	6640	6940	6918
Memphis, Tennessee (A)	592	447	427	3428	2618	2974
Meridian, Mississippi (A)	379	329	309	2717	1764	2239
Milwaukee, Wisconsin (A)	977	1006	983	6284	6040	6072
Minneapolis, Minnesota (A)	980	1065	1057	6547	6664	6919
Moline, Illinois (A)	898	861	862	5954	5451	5659
Montgomery, Alabama (A)	319	295	288	2524	1593	2057
Nashville, Tennessee (A)	643	511	498	3891	2888	3284
New Haven, Connecticut (A)	807	809	865	4852	4975	5128
New Orleans, Louisiana (C)	186	111	163	1535	732	1156
New York, New York (C)	763	712	753	4340	4185	4423
Newark, New Jersey	752	705	760	4447	4333	4643
Norfolk, Virginia (A)	655	508	500	3413	2752	3130
North Platte, Nebraska (A)	1272	935	887	5988	5705	5738
Oak Ridge, Tennessee (C)	617	491	633	3786	2661	3743
Oakland, California (A)	410	346	360	2068	2438	2389
Oklahoma City, Oklahoma (A)	737	560	472	3827	3397	3312
Omaha, Nebraska (A)	904	821	831	5579	5183	5559
Parkersburg, West Virginia (C)	800	672	672	4741	3979	4271
Peoria, Illinois (A)	868	824	828	5557	5071	5408
Philadelphia, Pennsylvania (C)	724	644	667	4171	3784	4061
Phoenix, Arizona (A)	245	107	175	1369	1175	1430
Pittsburgh, Pennsylvania (C)	818	694	735	4808	4163	4496
Pittsfield, Massachusetts (A)	982	974	1060	6179	6290	6475
Pocatello, Idaho (A)	897	803	880	5758	6120	5962
Portland, Maine (A)	889	965	1039	5714	6395	6406
Portland, Oregon (C)	540	524	515	3050	3805	3500
Providence, Rhode Island (A)	816	804	874	4851	5076	5213
Pueblo, Colorado (A)	913	734	775	4694	4530	5023
Raleigh, North Carolina (A)	625	499	440	3686	2846	2874
Rapid City, South Dakota (A)	1057	966	1045	5819	6207	6359
Reading, Pennsylvania (C)	779	690	725	4589	4303	4510
Red Bluff, California (A)	469	340	336	2582	2352	2318
Reno, Nevada (A)	861	693	756	4895	5175	4946
Richmond, Virginia (A)	696	546	550	3978	3295	3618
Rochester, New York (A)	965	944	992	5806	5620	5862
Roswell, New Mexico (A)	752	409	443	3395	2911	3211
Sacramento, California (C)	410	289	317	2294	2267	2314
St. Joseph, Missouri (A)	863	729	648	5236	4703	4294
St. Louis, Missouri (C)	803	633	620	4485	3899	4098
Salt Lake City, Utah (A)	795	667	741	4879	5004	5099
San Antonio, Texas (A)	289	132	190	1794	1132	1545
San Diego, California (A)	221	161	223	759	834	1265
Sandusky, Ohio (C)	896	829	853	5321	4897	5088
San Francisco, California (C)	359	330	317	1763	1930	1996
Sault Ste. Marie, Michigan (A)	1046	1232	1302	7098	7580	7671
Savannah, Georgia (A)	333	255	238	2322	1401	1667
Scranton, Pennsylvania (A)	946	886	859	5662	5483	5282
Seattle, Washington (C)	539	561	558	3031	3848	3595
Sheridan, Wyoming (A)	1038	932	1035	5932	6360	6642
Shreveport, Louisiana (A)	391	308	272	2381	1806	2056
Sioux City, Iowa (A)	968	901	930	6004	5802	6231
Spokane, Washington (A)	804	841	834	5034	6138	5770
Springfield, Illinois (A)	872	761	713	5220	4708	4734
Springfield, Missouri (A)	866	655	632	4533	3905	4256
Syracuse, New York (A)	943	920	955	5776	5600	5637
Toledo, Ohio (A)	897	868	905	5601	5301	5522
Topeka, Kansas (C)	851	677	669	4734	4317	4499
Trenton, New Jersey (C)	764	713	735	4473	4267	4495
Tulsa, Oklahoma (A)	696	513	485	3660	3214	3367
Utica, New York (O)	916	914	989	6112	6452	5955
Valentine, Nebraska (A)	1165	1018	970	6159	6223	6140
Walla Walla, Washington (C)	619	623	564	3736	4794	4301
Washington, D. C. (C)	726	584	606	4146	3572	3864
Wichita, Kansas (A)	891	646	619	4606	4118	4183
Williston, North Dakota (C)	1217	1098	1194	7078	7635	7836
Winnemucca, Nevada (A)	911	760	794	5301	5606	5396
Yakima, Washington (A)	744	722	408	4645	5717	5172

For footnotes, see page 132.

Comfortable students are better students at Washburn University

SEASONMAKERS

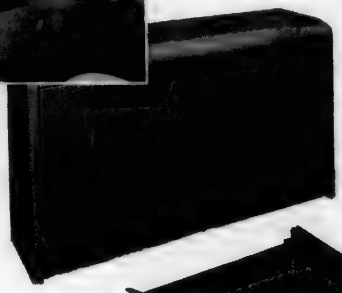
Comfortable students are receptive, alert students eager to learn. The New Margaret Mulvane Morgan Memorial is air conditioned by 112 McQuay floor type Seasonmaker units to provide the finest low cost and economical year 'round comfort. There is a McQuay unit especially designed for every type and every size heating and air conditioning job—old or new, large or small. Each has the inherent built-in quality and dependability for which McQuay has been famous for more than a quarter century. Consult your McQuay representative or write McQuay, Inc., 1619 Broadway St. N. E., Minneapolis 13, Minn.

Typical classroom, showing McQuay floor type Seasonmaker air conditioning units.

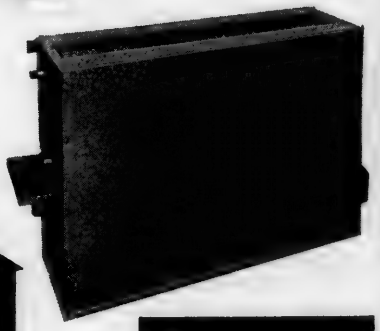
Margaret Mulvane Morgan Memorial, Washburn University, Topeka, Kansas
Architects: Thos. W. Williamson and Victor H. Loebsack & Assoc., Topeka
General Contractor: M. W. Watson, Topeka; Plumbing and Heating: Sheahan and Degan, Topeka

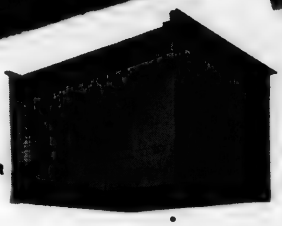
HIDEAWAY TYPE SEASONMAKER

FLOOR TYPE SEASONMAKER



BASIC TYPE SEASONMAKER





CEILING TYPE SEASONMAKER

FLOOR TYPE SEASONMAKER—for free standing floor mounting. four sizes, 200 to 600 cfm, ½ to 2 ton nominal cooling capacity. Both thermally and acoustically insulated. Choice of three air discharge grilles.

HIDEAWAY TYPE SEASONMAKER—for concealed, suspended mounting in closets, attics or furred spaces, Seven sizes, 200 to 2000 cfm, ½ to 5 ton nominal cooling capacity. Insulated drain pan,

CEILING TYPE SEASONMAKER—for suspended mounting. Seven sizes, 200 to 2000 cfm, ½ to 5 ton nominal cooling capacity. Thermally and acoustically insulated.

BASIC TYPE SEASONMAKER—for fully recessed built-in wall installations. Four sizes, 200 to 600 cfm, ½ to 2 ton nominal cooling capacity. Thermally and acoustically insulated.

TV means Quality

McQuay INC.

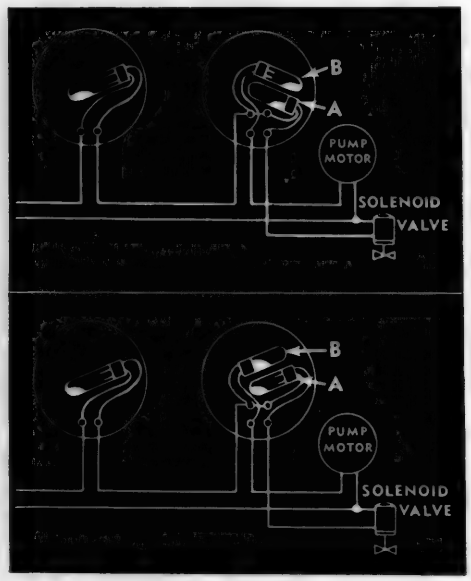
AIR CONDITIONING
HEATING
REFRIGERATION

PRODUCT APPLICATIONS

New, Unusual, or Ingenious Uses of Equipment and Materials

Controls Provide Water-System Pressure As Required by Codes

A pressurized water system is required by many local codes to assure water pressure in a building. Where the codes specify a system comprising a compression tank and water pump, they usually also require automatic operation. Air for pressurization is controlled, usually by



a solenoid valve, occasionally by starting and stopping a compressor.

These hydropneumatic systems can be effectively controlled by use of a pressure control (left in drawing) and a liquid level control (right), states The Mercoid Corp., Chicago, Ill., a manufacturer of these devices.

When water level and pressure in the tank are up to desired values, controls are in position as shown in upper diagram. The circuit in the pressure control is off so that pump cannot run and valve is closed. Mercury switch (A) of the level control is closed. Mercury switch (B) is open. As soon as water level drops, due to normal usage, the liquid level control will function and its circuit will assume the position shown in the lower drawing. Switch (A) will be open, switch (B) closed. Pressure, however, will not have dropped enough to close the pressure control circuit so that the pump will not run. As the level continues to drop, pressure will decrease. When it decreases to the lower setting of the pressure control, the control closes its circuit.

With the pressure control circuit closed, current will flow through (B) to start the pump. The valve will not operate, since (A) is open. Pump will continue to run until water level rises to its original level. Then level control will reset to the position shown at top of drawing. If the pressure control (left) has still not reopened its circuit, the solenoid valve will open and allow air pressure to build up to the setting of the pressure control.

Effectiveness of Aluminum Sun Controls Maintained by Protective Lacquer

Advantages of exterior aluminum awnings and cornices in reducing air conditioning costs for commercial buildings have become a potent factor in the marketing of sun-control products for a major manufacturer in the field. The key to this approach, however, depends upon the sustained protection of the aluminum surface from weathering and corrosion. Since unprotected aluminum exposed to weather soon becomes dull and pitted and accumulates dirt and grime, its heat reflectivity decreases markedly with a considerable loss of effectiveness as a sun-control device. In order to preserve the surface of its products, O. O. McKinley Company, Inc., of Indianapolis, Ind., applies, by spraying or dipping, as illustrated, a clear, protective lacquer based upon Half-Second Butyrate. The butyrate lacquer, a non-yellowing

coating specifically developed for aluminum, not only preserves the metal surface but makes it simple to keep clean so that the natural beauty and effectiveness of the original installation are maintained.

Formerly using clear enamels to coat their aluminum surfaces, the company finally adopted a lacquer formulation developed by Egyptian Lacquer Manufacturing Co., Newark, N. J., and based upon Half-Second Butyrate supplied by Eastman Chemical Products, Inc., of Kingsport, Tenn., a subsidiary of Eastman Kodak Company. Before adopting the lacquer as a standard coating, McKinley subjected the formulation to severe intermittent salt tests and long-term weathering exposure.

(Product Applications continued on page 138)

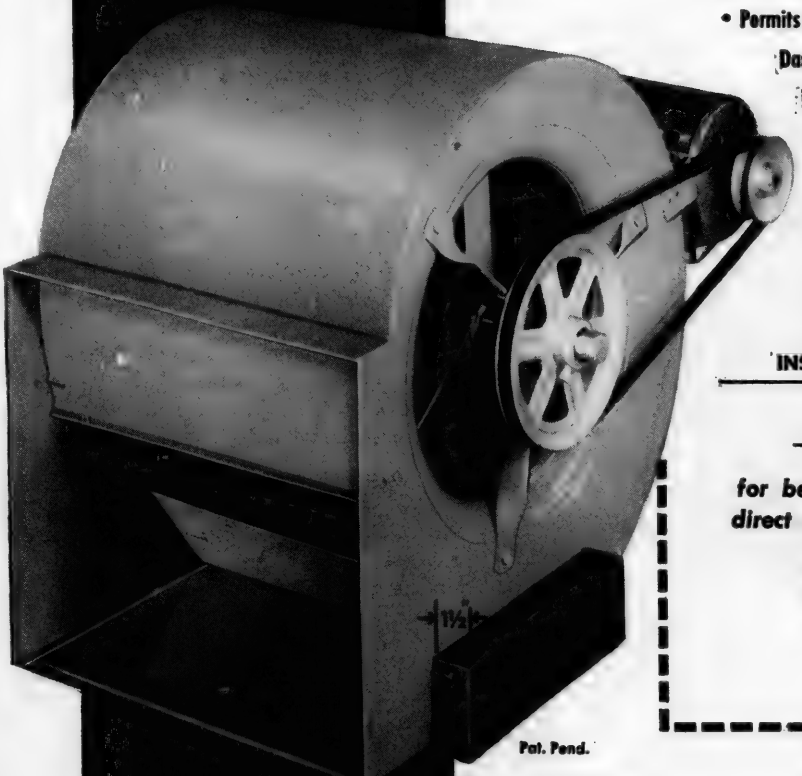
upgrade your unit now with

Send for FREE data*

Du-Air 2-VOLUME AIR DELIVERY

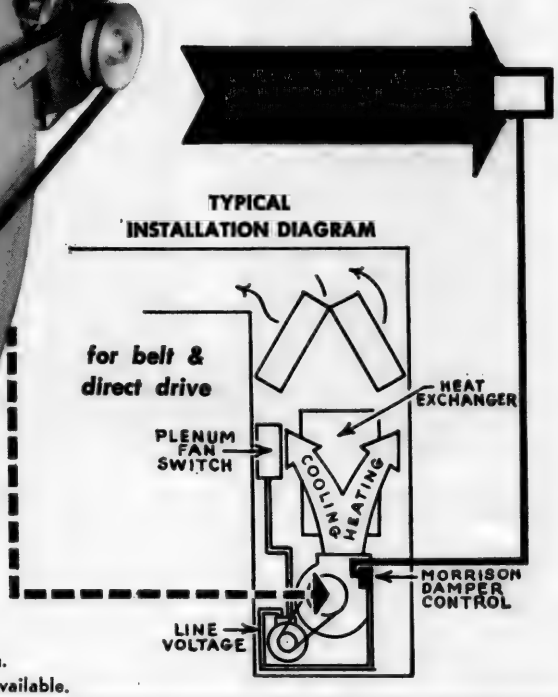
you can design for Ideal Heating and Cooling with a MORRISON Damper Control Blower

- Permits Ideal Heating • Eliminates Pulley Change
- Permits Ideal Cooling • Eliminates Motor Operated Dampers • Eliminates two speed fans, fans in series and fans operating individually



Pat. Pend.

Deluxe model shown.
Simplified models available.



*YES . . . please send me typical installation diagrams of the

MORRISON DAMPER CONTROL BLOWER

NAME _____

TITLE _____

COMPANY _____

ADDRESS _____

CITY _____ ZONE _____

STATE _____

MORRISON PRODUCTS, INC.
16816 Waterloo Road • Cleveland 10, Ohio

External Service Shaft Carries Utilities For Stainless Steel and Glass Building

A 252-ft high, 19-story building in the Chicago loop is the new home for Inland Steel Company's staff of 500 and some 1000 tenants. Inland is occupying the top eight floors. A total of 3.8-million gross cubic feet of completely unobstructed office space is offered with a uniquely arranged system of conditioning that utilizes cellular, honeycomb-like steel decks for air distribution.

All building utilities are contained in a 332-ft service shaft, seen in photo, which is external from the main office areas. This shaft carries the building power, air conditioning duct, elevators, chilled water and condenser risers, piping and stairs. The principal air conditioning equipment, manufactured by The Trane Company, La Crosse, Wis., includes two large capacity refrigeration units and a large number of air handling units, unit heaters and cooling and heating coils.

Major air conditioning problems centered around space economies, maintaining minimum floor-to-floor heights, compensating for large areas of glass (68% of the building exterior is glass, 32% stainless steel) and solar heat gain from the building's four orientations, providing for dissipation of heat from high interior light levels and room occupants, and keeping the perimeter spandrel height at an absolute minimum.

To solve the conditioning problems, five dual-duct medium velocity air systems were installed, permitting a minimum area in the core and maximum over-all economy.

Strategic location and architectural design of the building provided air conditioning advantages. Across the street to the west, the First National Bank Building shades the exposed side of the office building from the afternoon sun. In addition, 14 four-foot deep steel exterior support columns running the full height of the building along its east and west walls act as vertical shades when the sun is in the southwest.

Architect for the skyscraper was Skidmore, Owings and Merrill, while Turner Construction Company was the general contractor. Heating, cooling and piping were by Economy Plumbing and Heating Co.; ventilation was provided by Narowetz Heating and Ventilating Co.

Refinery's Fire-Vulnerable Areas Sprayed With Mineral and Cement Mix

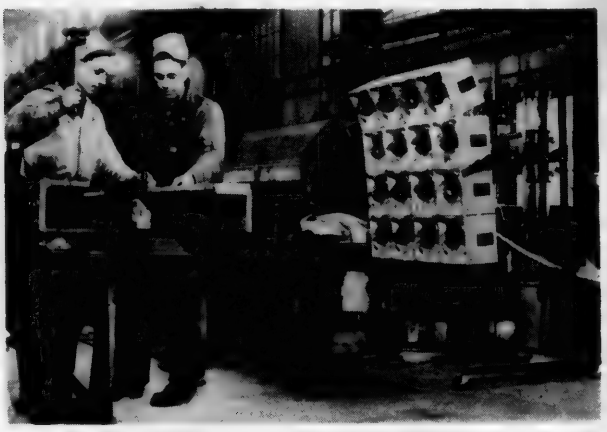
Supporting legs of two spheroid tanks at Sinclair Refining Corporation's refinery, Wood River, Ill., have been fireproofed with lightweight vermiculite concrete, according to Zonolite Company, Chicago.

The installation by Gunite Concrete and Construction Co., Kansas City, was accomplished quickly and efficiently with wet-gun spray application. The lightweight mobile equipment helped afford cleanliness and close control in the build-up of the two-inch protective coating. Proper mixes of vermiculite and portland cement for refinery fireproofing have been evolved jointly by Zonolite and the applicating firm, and are marketed under the trade name Blo-Crete.

Each tank at Wood River is supported on ten legs, 30 inches in diameter and 30 feet high. After application of the lightweight fireproof coating, a hard concrete wearing surface was sprayed to the legs.

Factory Cold Spots Easily Heated With Directed Radiant Energy

Many companies with areas too large to heat with a central heating system are finding a solution in infrared lamp sections. These portable units warm the workers by directing radiant energy at the work station. The infrared beams heat only the solid objects they fall upon, not the surrounding air. Thus small groups of personnel can be comfortable under the exposure of infrared



lamps without the expense of heating large, open spaces.

Small infrared heaters, such as those made by The Fostoria Pressed Steel Corp., Fostoria, Ohio, are highly flexible. They can accommodate any number of infrared lamps and can be moved from place to place without complicated installation. Photo shows company's heating units in use at Paxton and Vierling Iron Works, Omaha, Neb.

Infrared heaters serve a dual purpose in work areas where supplementary light is needed. White incandescent bulbs can be installed in some of the sockets of the section, providing comfortable heat and safe illumination at the same time.

Skidmore

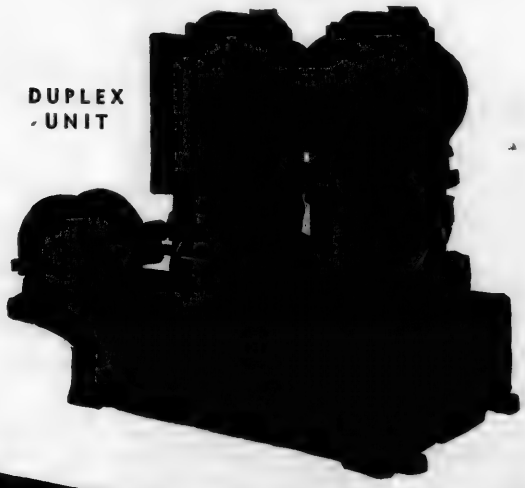
There's a Skidmore Pump designed for each and every heating requirement. *Write for bulletins*

THE SKIDMORE VACUUM PUMP

"Maintained Efficiency"

NS
ANT"

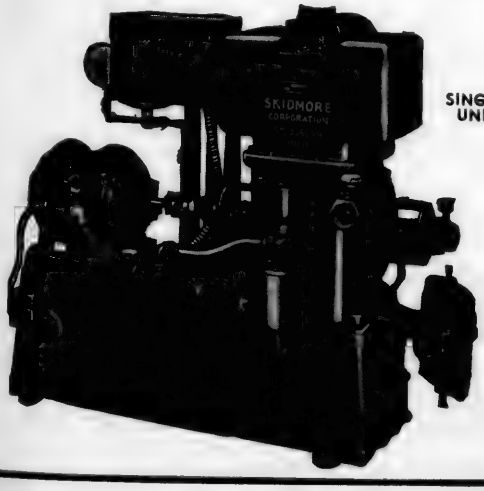
DUPLEX UNIT



SKIDMORE PUMPS EFFICIENCY

GREATER EFFICIENCY AND CAPACITY

Both the single and duplex unit automatically adjusts itself to the varying conditions of the system. Capacities ranging from 5,000 to 100,000 sq. ft. EDR.



SINGLE UNIT

ALL THE FEATURES YOU WANT — ARE FOUND IN THE SKIDMORE VACUUM AND BOILER FEED PUMPS

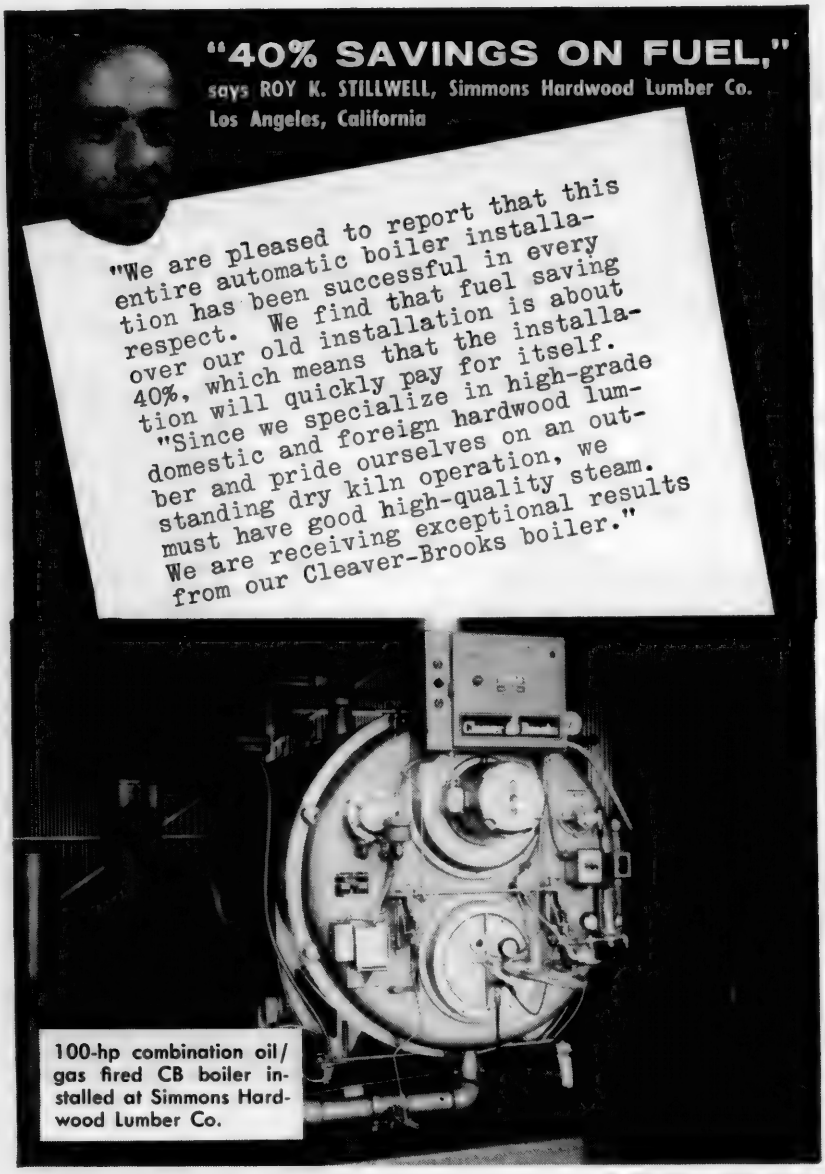
Perfect balance, structural simplicity and greater increase in efficiency is attained as compared to other pumps of the hydraulic type. Liberal clearance between moving parts positively eliminates wear. That is why all Skidmore Vacuum Pumps are famous for—"Maintained Efficiency."

Because wear is eliminated, the capacity and efficiency remain constant year after year without adjustment or expensive repairs. When you choose a Skidmore Vacuum Pump, you can do so with confidence, knowing that ten years from now it will still be performing its full duty satisfactorily.

Write today for descriptive bulletin

SKIDMORE PUMPS

SKIDMORE CORPORATION
ST. JOSEPH, MICHIGAN


"40% SAVINGS ON FUEL,"
says ROY K. STILLWELL, Simmons Hardwood Lumber Co.
Los Angeles, California
"We are pleased to report that this entire automatic boiler installation has been successful in every respect. We find that fuel saving over our old installation is about 40%, which means that the installation will quickly pay for itself.
"Since we specialize in high-grade domestic and foreign hardwood lumber and pride ourselves on an outstanding dry kiln operation, we must have good high-quality steam. We are receiving exceptional results from our Cleaver-Brooks boiler."
100-hp combination oil/gas fired CB boiler installed at Simmons Hardwood Lumber Co.

For process steam economy . . .

Install a packaged CB boiler

CB boiler four-pass design with forced draft is the most efficient combination to transmit heat to boiler water. Forced draft blower provides correct amount of air for complete combustion, eliminates the need or cost of a high, expensive chimney. Combustion gases are forced at high velocity through the four passes, literally scrubbing heat from the flame. Result: lower fuel costs.

Five square feet of heating surface per boiler hp is another reason why CB boilers give you longer service life with less maintenance. Every CB boiler is guaranteed to operate at a minimum efficiency of 80%.

Each Cleaver-Brooks self-contained boiler is a complete package. Fully factory tested, it's ready for installation, service connections and operation. No make-ready delays . . . no extra parts needed.

A trained technician starts your CB boiler, adjusts it for your specific needs, and trains your attendant in care and maintenance.

Available in 19 sizes, 130 models, 15 to 600 hp — steam or hot water, gas, oil, or combination oil/gas fired.

For more facts on the self-contained CB boiler, contact your dealer or write: Cleaver-Brooks Company, Dept. F, 315 E. Keefe Ave., Milwaukee 12, Wisconsin.

Cleaver Brooks®

ORIGINATORS OF SELF-CONTAINED BOILERS

NEW CATALOGS

Use the prepaid postcard on last page for securing your copies of catalogs described in this department.

BALANCING AIR DIFFUSERS—In complete detail, this data book from Illinois Testing Laboratories, Inc., Chicago, Ill., describes the simple procedure for testing and balancing air diffusers with an Alnor Velometer. Each section of the book contains complete engineering data on a leading brand of diffuser, and detailed instructions on the procedure that quickly establishes actual air delivery of the various types and sizes of units.

Circle **Item 67** on Inquiry Card

FAN AND BLOWER MOTORS — Announced by General Electric Co., Schenectady, N. Y., is Bulletin GEA-6134B, a 12-page publication which contains design, dimension, rating, performance, and application data on shaded pole motors for such applications as window ventilator, and condenser fans; domestic appliances; unit heaters; small direct-drive furnace heaters; dehumidifiers; and evaporative coolers.

Circle **Item 68** on Inquiry Card

150-LB BRONZE VALVES— Illustrated literature on its 150-lb WSP bronze globe, angle, and check valves has been issued by Walworth Company, New York, N. Y. The bulletin contains service ratings, dimensional drawings for each type valve, and an exploded view of a globe valve. In addition, inventory and service advantages of interchangeability of parts with these bronze valves are detailed in the new bulletin.

Circle **Item 69** on Inquiry Card

AIR-COOLED CONDENSER — Newly published literature on the company's Unicon remote-type air-cooled condenser indicates its application for tonnages without limit. Bulletin U-391, from Kramer Trenton Co., Trenton, N. J., includes rating tables of systems from 15 to 540 tons, dimensional information, drawings of typical installations, performance data, and simplified selection tables.

Circle **Item 70** on Inquiry Card

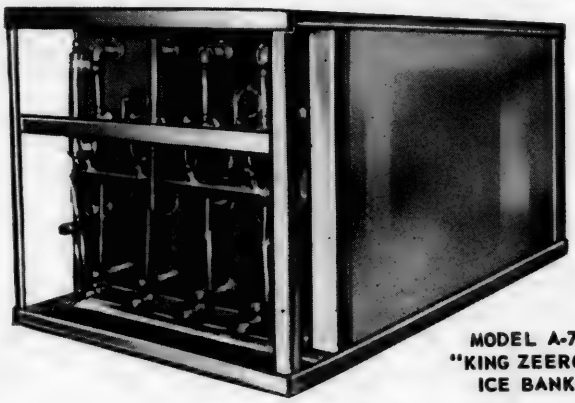
AUTOMATIC VALVES—A 4-page bulletin, No. 7F, is available from the A. W. Cash Valve Mfg. Corp., Decatur, Ill., featuring quick-reference data on the company's pressure reducing and regulating valves, back pressure valves and diaphragm operated control valves. The folder gives a resume of seven different valves, including available pressures, body materials, service and pipe sizes.

Circle **Item 71** on Inquiry Card

(Continued on page 142)

Add a "King Zeero" ICE BANK to Your Refrigerating System for Effectual, Economical Air Conditioning

The "King Zeero" **ICE BANK** is designed to deliver 32° to 34°F. ice water for recirculation through air cooling coils in exactly the right amount when and where it is needed. It levels off "peak" and "valley" loads. Peak loads many times compressor capacity are easily handled. Ice Banks may be added to increase existing capacity. Refrigerant: Freon, Methyl Chloride or Ammonia.



MODEL A-7
"KING ZEERO"
ICE BANK

CAPACITIES - 500 lbs. to 30,000 lbs. (72,000 B.T.U.'s to 4,320,000 B.T.U.'s) in a single unit. Multiple units may be installed.

The Patented Coils with Built-in Louvres opposed to the flow of water through the ICE BANK provide turbulence. This eliminates a mechanical agitator - insures all the water rubbing all of the ice. No upkeep or repair expense whatever.

The "King Zeero" Ice Storage System of water chilling has definite advantages over direct expansion, or other types of ice accumulators.

Saves power through smaller compressor requirement. Simple construction (no moving parts). Dependable in performance. Low operating and costs.

Let the ice stored during light loads take care of peak loads. The compressor need only handle the average daily load - not the peak.

THE KING ZEERO COMPANY
4300-14 W. Montrose Ave. - Chicago 41, Ill.
Manufacturers of Ice Builders - Ice Builder Cabinets - Ice Banks

Bond Insulation PERMANENTLY with

ST. CLAIR

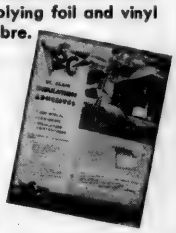
Specially Formulated Insulation Adhesives

ST. CLAIR Insulation Adhesives provide excellent coverage, high heat resistance and easier handling of insulation which can be bonded immediately or up to 45 minutes after applying adhesive.

These insulation adhesives afford fine results for bonding insulation to ducts. They supersede pins and clips, wires, screws, and caps, because they save on installation cost while providing a better, neater and more permanent bond.

ST. CLAIR also produces clear and white adhesives for bonding lap seams on pipe insulation—also other adhesives for applying foil and vinyl facings to glass fibre.

Send for Free Sample & Catalog



ST. CLAIR RUBBER CO.
440-C E. JEFFERSON AVE. • DETROIT 26, MICH.

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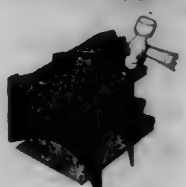
CAINS

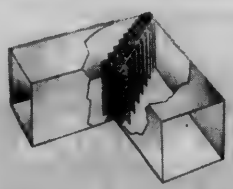
COIL OF PROFIT

INSTANT-VANE RAIL

ELIMINATES

Layout—Tab Cutting—Hole Punching —Spot Welding—Riveting—Etc. Results in a Savings Up to 70% over old methods.





Best method ever devised for installing Turning Vanes (single or double) in sq. elbows. In coils. Pull out, shear off—insert vanes and peen with hammer. No valuable time lost.

Union Made

SOLD ONLY THROUGH JOBBERS AND DISTRIBUTORS
Some Territories Open for Manufacturers Agents Calling on Jobbers and Distributors
CAIN MANUFACTURING CO.
1151 North 5th Avenue Phone FA 2-0558 Birmingham, Alabama

Costs Less Because It Gives the Most in Service

When selecting unions it will pay you to remember 2 things: (1) Darts can be used over and over again — on location after location (2) On location after location, they give a drop-tight seal. How can you beat this combination for economy . . . at any price?

QUICK FACTS

- Extra wide bronze seats resist pitting and corrosion
- Nut and body of air-refined, high test malleable iron are practically unbreakable
- Heavy shoulders can withstand the toughest wrench abuse
- Each Dart is individually vacuum-tested

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AVAILABLE THROUGH YOUR LOCAL DISTRIBUTOR

NEW CATALOGS

(Continued from page 140)

Use the prepaid postcard on last page for securing your copies of catalogs described in this department.

PREFABRICATED PIPING SYSTEMS — Ric-wiL, Inc., Barberton, Ohio, announces publication of its revised product catalog. The new edition covers construction features for prefabricated, insulated piping systems for steam, hot water, oil or refrigeration distribution lines. Specifications include insulation types and thickness, trenching, back filling, height of cover, and conduit sizing charts.

Circle **Item 72** on Inquiry Card

HUMIDITY CONTROL—Literature on the two models of the Humidistat, an automatic control for dehumidifiers and humidifiers, is available from Friez Instrument Div., Bendix Aviation Corp., Baltimore, Md. Unit is available as a standard accessory for wall mounting or as a built-in controller designed for original equipment. Model 80 is designed for dehumidifiers, and Model 82 for humidifying equipment.

Circle **Item 73** on Inquiry Card

AIR DIFFUSING GRILLES—An enlarged line of extruded aluminum Linear Type grilles, available in many new models and sizes, is described in a catalog published by Titus Manufacturing Corp., Waterloo, Iowa. It contains the latest complete engineering information including data on vertical and horizontal projection, ceiling effect, and relationship of active to inactive grille sections.

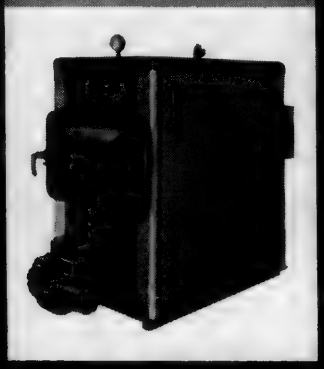
Circle **Item 74** on Inquiry Card

HIGH TEMPERATURE FANS — A 20-page bulletin from General Blower Co., Morton Grove, Ill., introduces the company's line of forward curved, Dura-Temp fans for operating efficiency at elevated temperatures. Bulletin HF-100 includes theory of heat fan performance and selection, as well as performance tables and selection guides.

Circle **Item 75** on Inquiry Card

ACTIVATED CHARCOAL—The answers to questions concerning activated charcoal are now visually available to qualified groups in the form of three films produced by Barnebey-Cheney Co., Cassady at Eighth Aves., Columbus 19, Ohio. Titles of the films and their approximate running time are: The Spirit of Activated Charcoal—12 min.; The Black Magic of Activated Charcoal—5 min.; Activated Charcoal Visits the Heating and Air Conditioning Exposition—9 min.

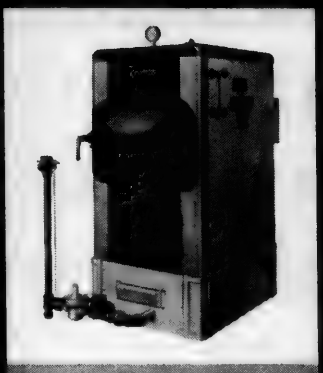
(Continued on page 144)



Oil-fired units are equipped with a Kewanee pressure atomizing burner for No. 1 or No. 2 oil. Firing rate is matched to boiler capacity. Burner and controls are shipped in separate, protective cartons, ready for wiring. Insulated metal jacket shown is optional.

new packages!

15 lb steam or 30 lb water
216,000 to 1,800,000 Btuh



Gas-fired units feature Kewanee's atmospheric type drilled port gas burner for natural, mixed, manufactured or L.P. gases. Firing is automatic ... matched to boiler capacity. Burner and controls are shipped in separate, protective cartons ... installation is easy.

KEWANEE® SQUARE-HEAT TYPE "R" BOILER-BURNER UNITS

All 12 sizes of one of the best-known, best-*proven* boilers for domestic and commercial heating are now available with matching burners for gas or oil.

Ideal for service in small to medium buildings and larger homes, Kewanee Square-Heat Type "R" Units are quiet, efficient and dependable. Their record is established, you *know* what to expect from them.

Even the largest sizes take little floor space and fit easily under an 8-foot or even a 7-foot ceiling. All the famous Kewanee features are there: 3" fire tubes expanded into tube sheet holes with ends beaded . . . large firebox for complete combustion . . . cast iron flue door, machine ground and refractory insulated . . . widely spaced tubes, large disengaging area and ample steam space.

See your Kewanee Man for further facts . . . or send coupon at right to: AMERICAN-STANDARD, KEWANEE BOILER DIVISION, 117 Franklin Street, Kewanee, Illinois.

American-Standard
Kewanee Boiler Division
117 Franklin Street, Kewanee, Ill.

KEWANEE 1856 1956 90th year

Please send descriptive literature and catalog sheets on the new Kewanee Square-Heat Type "R" packaged units.

Name_____

Firm_____

Street_____

City_____ Zone____ State_____

AMERICAN-STANDARD PRODUCTS

AMERICAN-Standard
KEWANEE BOILER DIVISION

These 5 big plus advantages prove you're right to choose

Power Line

for your industrial ventilation requirements

1. Complete line: Broadest product line of air-moving equipment for every industrial requirement.

2. Certified performance: All Power Line Fans are rated by PFMA and by NAFM.

3. Backed by 33 years of specialization in manufacture of highest quality ventilation equipment.

4. Competitively priced to give you important cost savings in initial investment and in maintenance. You get the precisely right product to fit your requirements. You don't over-buy with equipment too large or under-buy with equipment too small.

5. Sold only through qualified ventilation specialists. You get expert technical advice and service from the survey of your requirements right through to the completion of your installation.

YOURS ON REQUEST: Big 20-page Power Line Catalog gives complete facts about industrial ventilation, including selection of proper type and size of fan, calculation of duct resistance, and installation procedures, plus features, dimensions, specifications and performance data. Without obligation write for your free copy of Catalog No. 36A.

POWER LINE FAN COMPANY, INC.

Subsidiary of Chelsea Products, Incorporated 639 South Avenue, Plainfield, New Jersey

NEW CATALOGS

(Continued from page 142)

Use the prepaid postcard on last page for securing your copies of catalogs described in this department.

ALUMINUM SHEET AND PLATE—Peter A. Frasse & Co., Inc., New York, N. Y., announces a chart, Sec. G, No. 1, which covers both Government specifications and helpful information on the bending and forming of aluminum sheet and plate. With the new chart, specifications can easily be identified. It shows chemical analysis requirements for the most frequently used Federal and military specifications, as well as specified forms (sheet, bar, etc.) and the nearest corresponding ASTM, SAE and AMS specification numbers.

Circle **Item 76** on Inquiry Card

FAN-MOTOR MOUNTING—A 10-point information capsule, titled Advantages of Installing Motors Inside the Housing on Air Handling Units, is available from Drayer-Hanson, Div. of National-U. S. Radiator Corp., Los Angeles, Calif. The factual piece, first compiled as a marketing tool for use of the company's sales agents, deals with safety, noise, maintenance, and space-saving factors of inside motor mounting.

Circle **Item 77** on Inquiry Card

REFRIGERATION PRODUCTS— Madden Brass Products Co., Aurora, Ill., announces a 26-page catalog, No. R-358, describing its refrigeration and air conditioning products. The catalog includes items which have been added to the company's line such as charging and testing units, color coded charging lines, small service valves, and many new sizes and fittings.

Circle **Item 78** on Inquiry Card

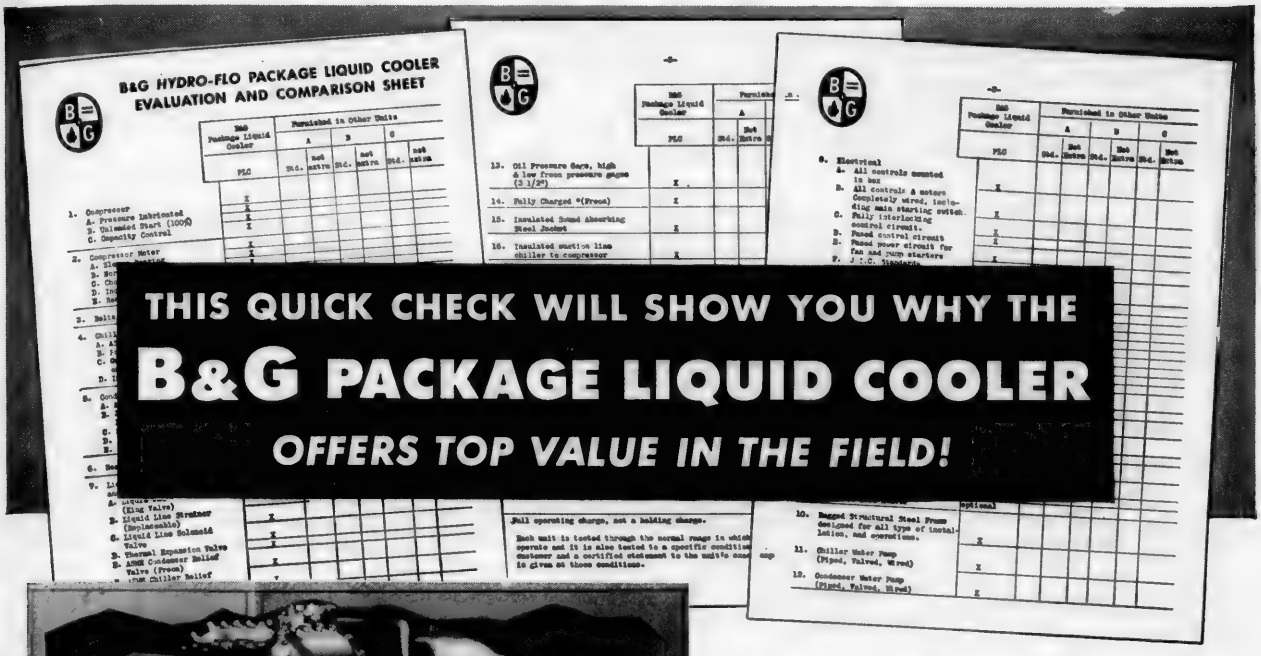
FILLED-SYSTEM THERMOMETERS — A 56-page catalog, No. C-60-2, published by Industrial Div., Minneapolis-Honeywell Regulator Co., Philadelphia, Pa., describes complete line of Brown rectangular case, filled-system thermometers. The 56-page catalog covers in detail temperature instruments including indicators, recorders, transmitters, and electric and pneumatic controllers.

Circle **Item 79** on Inquiry Card

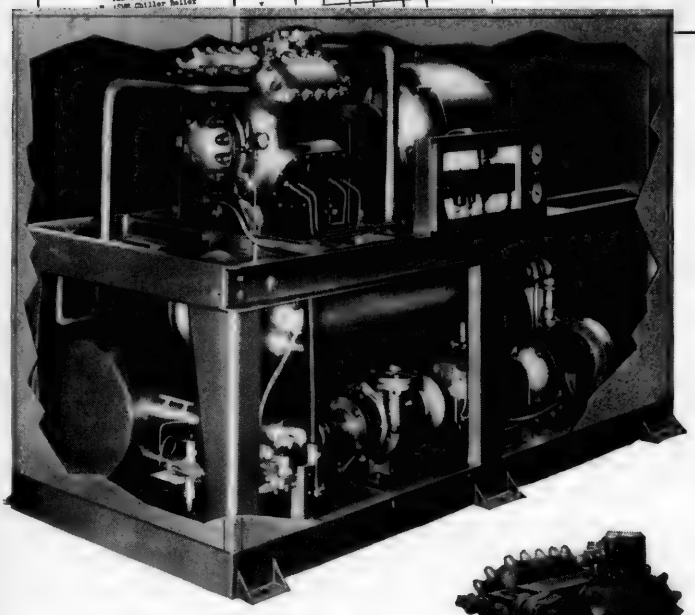
AIR AND LIGHT DIFFUSER—A combined light- and air-diffusing troffer, called Paraflo, is the subject of a folder available from Day-Brite Lighting, Inc., St. Louis, Mo. The folder graphically explains the operation of this unit.

Circle **Item 80** on Inquiry Card

(Continued on page 146)



THIS QUICK CHECK WILL SHOW YOU WHY THE B&G PACKAGE LIQUID COOLER OFFERS TOP VALUE IN THE FIELD!



Send for a set of Evaluation Charts as illustrated above—compare the *standard* equipment of the B&G Package Liquid Cooler with that of any other. You'll see for yourself that *you can buy B&G quality at smaller installed cost!*

With this *completely packaged* unit, costs which might otherwise be charged against the job are eliminated. For example—

No inside wiring costs. The finest electrical controls are furnished, *completely wired and fully interlocked!*

No inside piping costs. Both chiller and condenser pumps are sized to specification, mounted, piped and electrically interlocked.

No structural framing costs. All equipment is mounted on a rugged steel frame—a permanent base.

No metal forming costs. Standard equipment includes a heavy gauge steel jacket with sound-deadening undercoating and Hammerloid finish.

No insulating costs. The suction line and heat exchanger are fully insulated.

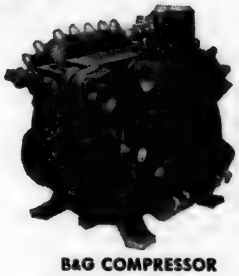
No testing costs. Fully tested under specified operating conditions and also under varying load conditions. All valves adjusted and balanced.

No extras to buy. Standard equipment includes gauges, compressor motor, all belts, driving sheave, compressor fly wheel, increment start, full sized heat exchanger and full operating charge of Freon.

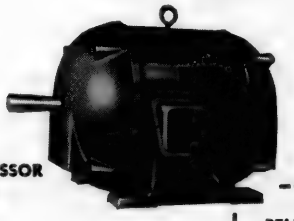
Capacities: Ten units from 7½ to 75 tons

EQUIPPED WITH B&G PRODUCTS THROUGHOUT

The only unit of its kind with all major components designed, built and guaranteed by one manufacturer.



B&G COMPRESSOR



B&G COMPRESSOR MOTOR

BELL & GOSSETT COMPANY

Morton Grove, Illinois

Canadian Licensee: S. A. Armstrong Ltd., 1400 O'Connor Drive, Toronto 16, Ontario

BELL & GOSSETT COMPANY, Dept. RFG-5, Morton Grove, Illinois

Please send complete file of data on B&G Package Liquid Coolers.

*Name*_____

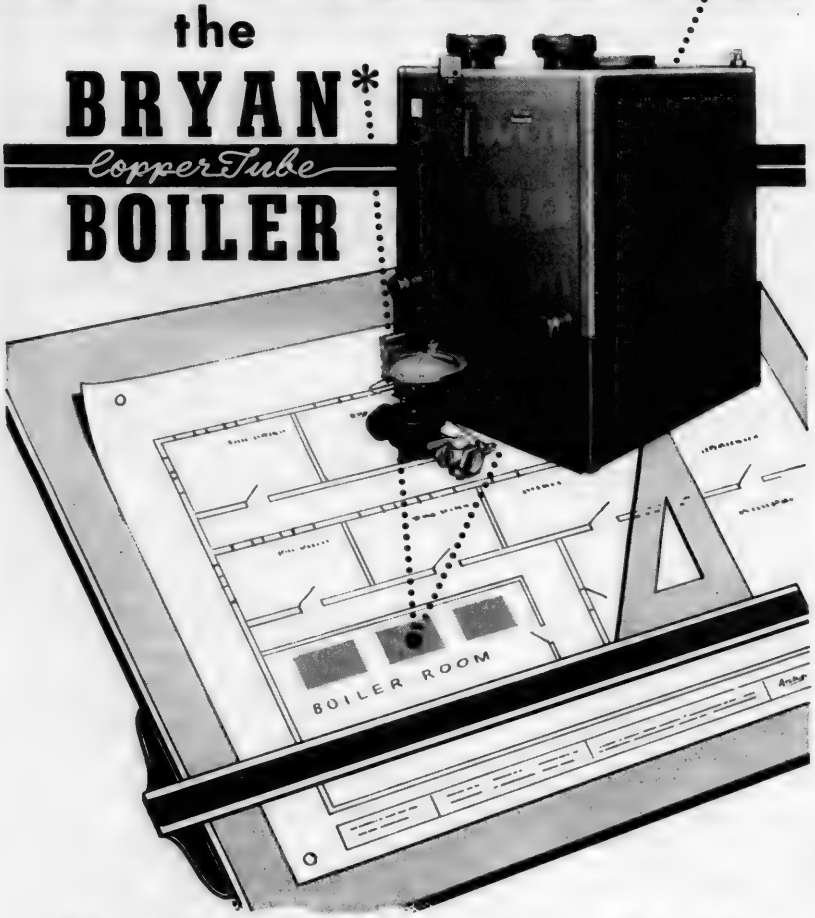
*Firm Name*_____

*Address*_____

*City*_____ *Zone*____ *State*_____

to FIT the JOB*

the BRYAN* Copper Tube BOILER



For every steam or water heating application up to 1,800,000 B.T.U. output.

Whether the plans on your boards are for a factory, apartment house, swimming pool or a modest radiant heat home, a detailed check on specifications will point to one of the many Bryan models covering low or high pressure steam, hot water boilers, or indirect water heaters.

The Bryan is a heavy duty, durable boiler made to deliver a lot of B.T.U's in a short period of time. Specially engineered for gas or oil heating, its high efficiency is complemented by years of trouble free service. Requires minimum floor space.

Bryan is the originator of the famous Bryan copper tubes. They are used in both direct and indirect heating units for fast action and elimination of scale deposits.

Bryan Gas Fired Boilers are designed and built to the requirements of the A.S.M.E. code and are also approved by the American Gas Association (A.G.A.)

Send For Technical Information • 2100 Chili Pike

BRYAN STEAM CORPORATION • Peru, Indiana

NEW CATALOGS

(Continued from page 144)

Use the prepaid postcard on last page for securing your copies of catalogs described in this department.

SCHOOLROOM COMFORT SYSTEM — A comprehensive manual on schoolroom packaged heating and ventilating systems has been prepared by Norman Products Co., Columbus, Ohio. The manual presents the requirements for complete classroom comfort and then shows how these needs are answered by the company's schoolroom system. Various applications of this warm-air, perimeter system and the economies it affords are also presented.

Circle **Item 81** on Inquiry Card

SUBMERSIBLE PUMPS— A complete line of domestic and industrial submersible pumps, with illustrated applications of their use, is featured in the Kenco Pump Catalog, published by Kenco Pump Division of The American Crucible Products Co., Lorain, Ohio. Designed as a convenient submersible pump handbook for plumbing contractors, consulting engineers, builders, and industrial maintenance engineers, this 8-page catalog lists physical dimensions, pumping capacities, electrical data and specific features for each pump as well as detailed engineer's specification forms as handy guides for specifying the pumps.

Circle **Item 82** on Inquiry Card

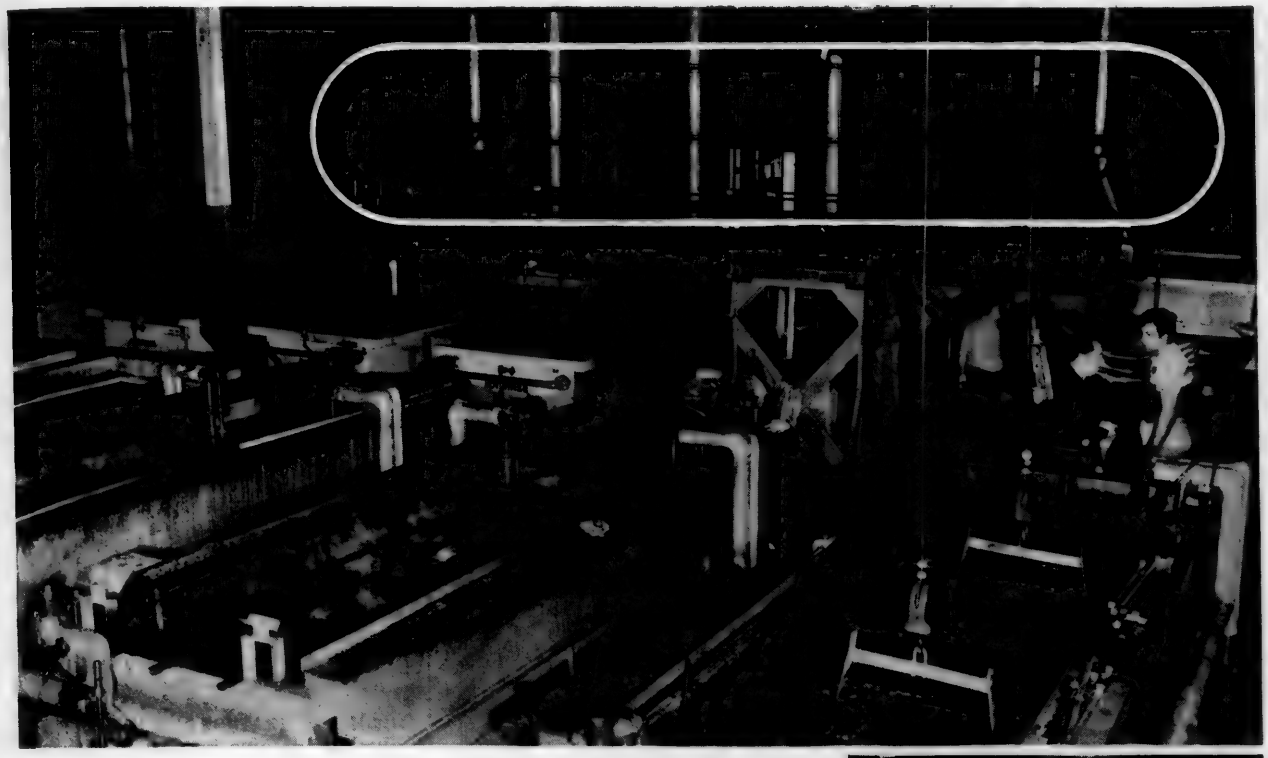
ELECTRODE SELECTION — How to select the most efficient electrode for any particular welding job is the subject of a 12-page directory published by The Lincoln Electric Co., Cleveland, Ohio. While there are usually several types of electrodes that will weld any job, there is always one type that does the best job at the lowest cost. The back of the Weldirectory is a wall chart containing frequently used information about the company's electrodes.

Circle **Item 83** on Inquiry Card

VOLUTE-TYPE CENTRIFUGAL PUMP— Eight-page Bulletin No. 1440, from Dunham-Bush, Inc., West Hartford, Conn., describes in detail Type A5 centrifugal pump of the volute type for horizontal or vertical installation. Application and features are itemized, and engineering data includes dimensional diagram, charts of dimensional data and maximum feet of water suction lift, rapid selection chart, fitting data chart for pipe size, and a table of altitude and water temperature correction.

Circle **Item 84** on Inquiry Card

(Continued on page 148)



Here's a Unique Answer to a Tough Ventilating Problem . . .

Efficient Plating Tank Exhaust with No Overhead Obstruction

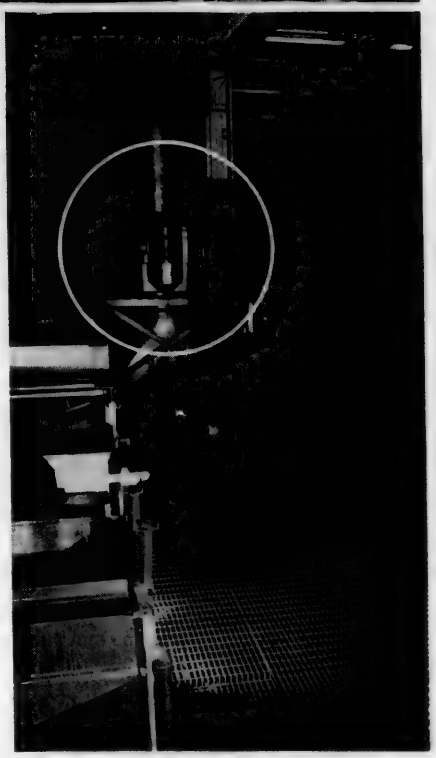
Hartzell High-Temperature Vaneaxial Blowers power this unique plating tank exhaust system at the Stratford, Connecticut plant of Sikorsky Aircraft Division, United Aircraft Corporation.

Use of the lateral slots and sub-floor ducts keeps aisles clear . . . and no part of the exhaust system extends above the tanks to hamper use of cranes in loading and unloading the tanks.

Exhaust of 200 CFM per square foot of tank area is provided with all blowers operating at approximately 2½" WG. Fumes are exhausted vertically through the roof.

Hartzell has the equipment that is just right for almost any industrial air moving job. See your nearby Hartzell field engineer for the details of how Hartzell can solve *your* tough air moving problem.

This installation was handled by the Hartzell field office at 1243 Post Road; Fairfield, Connecticut; phone Clearwater 9-3349.

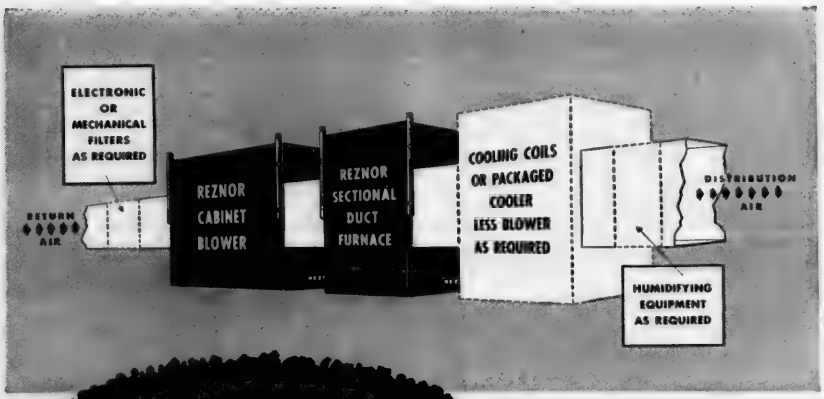


Why You Can Count on Hartzell Air-Moving Equipment for Long Life, Rugged Reliability and Minimum Maintenance

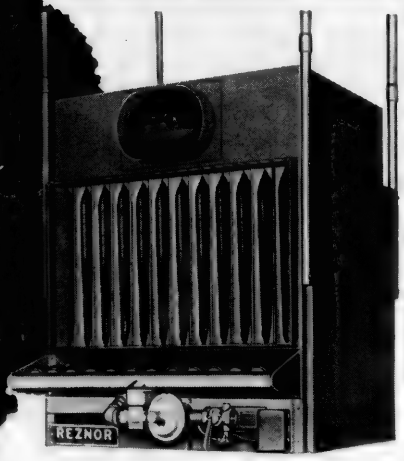
Hartzell fans and blowers are engineered and built for the exacting requirements of tough industrial service. There's no compromise with quality for the sake of shaving a few dollars on price. Hartzell fans are designed for the industrial buyer who is willing to pay for long life, dependable service and low maintenance.

HARTZELL
PROPELLER FAN CO.
Div. of Castle Hills Corp.
55 Thomas Blvd. • Piqua, Ohio

ENGINEERING OFFICES IN PRINCIPAL CITIES


ELECTRONIC OR MECHANICAL FILTERS AS REQUIRED
RETURN AIR
REZNOR CABINET BLOWER
REZNOR SECTIONAL DUCT FURNACE
COOLING COILS OR PACKAGED COOLER LESS BLOWER AS REQUIRED
DISTRIBUTION AIR
HUMIDIFYING EQUIPMENT AS REQUIRED

How to Match a Heating System to Exact Job Requirements



Reznor sectional duct furnaces free the designer from the limitations imposed by packaged heating equipment . . . equipment which can't be *exactly right* for any one job because it has to be *good enough* for so many different jobs.

A heating or heating-cooling system designed around a Reznor duct furnace can be matched to exact job requirements. Each duct furnace is a compact, highly efficient heat exchanger with a full set of operating controls. All other components,—for air moving, cooling, cleaning and moisture control—are separately specified and installer-supplied. Only those components which are necessary on the particular job need be included, with each individually selected to fit that one job.

Sectional assembly (a completely new concept in duct heating equipment) completely eliminates the installation problems which formerly prevented the use of large capacity custom-engineered duct heating systems. With the Reznor Series DS sectional duct furnace, systems with capacities in excess of 2,000,000 Btu can be assembled on the job from sections weighing no more than 315 pounds. Each of four basic sections—150, 200, 250, and 300 thousand Btu—is complete with controls and is provided with its own built-in draft diverter, flue connections and mounting pipes.

If you aren't taking advantage of the design flexibility of Reznor sectional duct furnaces, you're missing a good bet on many of your commercial, industrial and institutional jobs. Don't delay getting all the details on this versatile line of heaters. Give your nearby Reznor distributor a call—today.

REZNOR
WORLD'S LARGEST-SELLING DIRECT-FIRED UNIT HEATERS
Reznor Manufacturing Co.,
64 Union St., Mercer, Pa.

for complete details, wherever you are . . .

Look for Reznor under "Heaters-Unit" in the Yellow Pages

NEW CATALOGS

(Continued from page 146)

Use the prepaid postcard on last page for securing your copies of catalogs described in this department.

AIR CONDITIONING PRODUCTS — A 12-page bulletin that describes the complete line of Herman Nelson heating, ventilating, and air conditioning products is introduced by American Air Filter Co., Inc., Louisville, Ky. Bulletin 701 features the company's Roll-O-Vent automatic filter section and its adaptation to heating and ventilating units, industrial unit heaters, and air conditioning units. The bulletin also includes illustrations, descriptions, specifications, and performance data on many of the company's other heating, ventilating, and air conditioning products.

Circle **Item 85** on Inquiry Card

HIGH-TEMPERATURE PIPE INSULATION Number 101 pipe insulation, a speed-fastening, high-temperature mineral wool material, is described in a bulletin published by Baldwin-Hill Co., Trenton, N. J. Manufactured with tie wires already attached, the blanket-type insulation is designed for easy, efficient application around pipes with temperatures to 1200 deg F and from 4 to 30 inches dia.

Circle **Item 86** on Inquiry Card

ELECTRIC BLAST COIL HEATERS — Industrial Engineering & Equipment Co., St. Louis, Mo., announces newly revised bulletins covering electric blast coil heaters. Bulletin E-97U shows electric heaters for installation in ducts. These are manufactured to fit particular duct sizes, thereby permitting great economies in the field since no field or shop labor other than installation is required. Bulletin E-97P lists 275 models of blast coil heaters to fit 20 different makes of package air conditioners.

Circle **Item 87** on Inquiry Card

CORROSION PREVENTION— Corrosion and Its Prevention is the title of a new booklet published by the Engineering Department of the Air-Conditioning and Refrigeration Institute, 1346 Connecticut Ave., N.W., Washington 6, D. C. The publication consists of a general discussion of corrosion as it affects the air-conditioning and refrigeration industry, and includes information on atmospheric corrosion, corrosion of water circuits, and refrigerant circuits, and water treatment. Also included is information on accepted industry practice and recommendations for combatting corrosion. It is available from the Institute at seventy-five cents per copy.

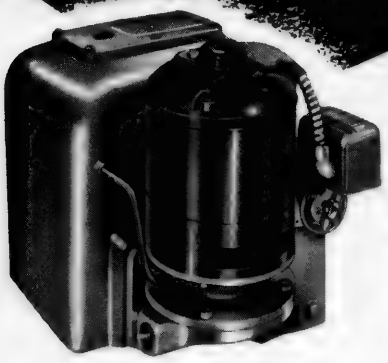
(Continued on page 150)

IT'S NEW! IT'S TOPS!

it's the Sterlco® 4223-E

LOW PRESSURE

CONDENSATE PUMP



- SURPRISING VERSATILITY
- UNUSUAL CAPACITY
- TREMENDOUS PERFORMANCE
- ECONOMICAL PRICE

- **DESIGNED SPECIFICALLY FOR SMALL INSTALLATIONS . . .** yet adequate for jobs up to 3000 sq. ft. EDR.
- **ALLOWS ACCURATE ADJUSTMENT . . .** Float switch travel can be adjusted for a draw of from .7 to 3 gals. per pumping cycle for close adjustment to boiler requirements.
- **SMALLER IN SIZE, YET BIGGER IN USABLE VOLUME . . .** a truly believe-it-or-not design. Although the 5 gal. cast iron tank is one of the smallest, it has greater "draw" or usable volume than many pumps with larger tanks.
- **LOTS OF EXTRA CAPACITY FOR EMERGENCIES . . .** Equipped with the same pump and motor used for the larger capacity ¼ h.p. Sterlco pumps.
- **TAKES LESS SPACE THAN ANY OTHER . . .** Occupies only 1.6 sq. ft. of floor space. Fits easily into almost any small corner because of rectangular shape and convenient location of motor and switch at front of unit.
- **EXCEPTIONALLY QUIET, RUGGED, DEPENDABLE . . .** Includes the same high quality features found in Sterlco's heavy duty pumps.

USE THE RIGHT PUMP FOR THE JOB!

The addition of the No. 4223-E makes the Sterlco 4100-4200 Series Condensation Pumps one of the most complete lines of low pressure pumps on the market.

Write now for complete information.

Sterlco Products Distributed Through Leading Heating and Plumbing Wholesalers. Representatives in all principal cities.

STERLING, INC.

5206 W. Clinton Ave., Milwaukee 13, Wisconsin

CONDENSATION AND VACUUM PUMPS

HEATING SPECIALTIES

TEMPERATURE CONTROLS

Safer because it's Simpler

MAGNETROL

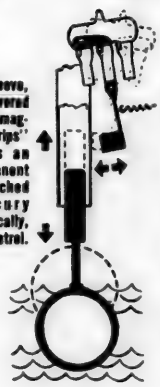
Boiler Water Level Controls

■ Of all boiler water level controls, we believe Magnetrol to be the safest. Certainly it is the simplest.

A PERMANENT Alnico magnet, located *outside* the float chamber, links boiler water level and electrical controls. This infallible magnetic link eliminates mechanical parts normally subject to wear and fatigue failure. *Pioneered and perfected by Magnetrol,* it provides almost unlimited operating life.

The brass "No-Scale" float chamber liner, another exclusive Magnetrol feature, is self-cleaning. It actually "flexes" off scale and prevents "sticking" of the float.

These are just two of *many* advances for greater boiler safety found *only* in Magnetrol. *Standard* Magnetrol units are available for temperatures up to 750°F., at pressures up to 600 psi, for single stage (low water cut-off) or multi-level stage (pump control *plus* low water cutoff and alarm) service with as many as three separate switching actions. Special units are available for more extreme requirements.



A magnetic sleeve, raised and lowered within a non-magnetic tube, "trips" or releases an Alnico permanent magnet attached to a mercury switch. Basically, this is Magnetrol.

MAGNETROL, Inc.

Mail the Coupon Now for the Facts

MAGNETROL, INC., 2106 S. Marshall Blvd., Chicago 23, Ill.

Gentlemen: Please send me Catalog Section III and full information on Magnetrol Boiler Water Level Controls. 9

Name_____

Company_____

Address_____

City_____ **Zone**____ **State**_____

for FUME

CONTROL

install

FLEXAUST®

HOSE

Made of strong neoprene coated cotton or nylon fabrics spiral wire reinforced.
For *all* kinds of fume and dust control, and ventilation uses.
Extremely flexible, durable, and lightweight.
Exceptionally easy to cut, install, connect, reuse, and relocate.
Sizes 1¼" thru 36" i.d.

Write for details today
Distributors
in all principal cities

THE FLEXAUST COMPANY
Dept. HV-5
PARK AVE. NEW YORK 17, N. Y.

NEW CATALOGS

(Continued from page 148)

Use the prepaid postcard on last page for securing your copies of catalogs described in this department.

EQUIPMENT AND SUPPLIES—A 160-page general catalog, available from A. R. Webber Co., West Haven, Conn., includes sections that will be of interest to heating, plumbing, air conditioning, refrigeration, and sheet metal dealers and contractors. Fully illustrated and described in detail are complete lines of heating, plumbing, and air conditioning supplies; a complete line of plumbing fixtures, plumbers brass, lighting fixtures, and electrical supplies; construction tools, hand and power tools; and custodial and maintenance equipment.

Circle **Item 88** on Inquiry Card

PRESSURE REGULATOR SELECTION — A 28-page bulletin, entitled Pressure Regulators—and how to Select Them, is issued by Kieley & Mueller, Inc., Middletown, N. Y. Of special interest is a ten-page prefatory section which explicitly spells out the most important considerations for correct application of self-operating and pilot-type pressure regulators. Included are a number of graphic tables that permit the reader to make rapid comparisons of basic regulator characteristics without reference to detailed specifications given elsewhere in the booklet.

Circle **Item 89** on Inquiry Card

CENTRIFUGAL ROOF VENTILATORS — Ilg Electric Ventilating Co., Chicago, Ill., has published a bulletin, No. 2700, on its complete line of Type L-CRF air-foil centrifugal power roof ventilators. Details are given on the backward curved airfoil design blade that permits moving more air with less noise, in both exhaust and supply applications. Capacity ratings, noise-level classifications, motor-selection specifications, installation notes, and descriptions of a complete range of accessories are included.

Circle **Item 90** on Inquiry Card

PREFABRICATED DUCT AND PIPE — A 40-page catalog which describes in detail the company's line of Seal-Tite prefabricated duct, pipe and fittings for heating and cooling is published by The Williamson Co., Cincinnati, Ohio. Indexed for speedy reference, the booklet illustrates and identifies each fitting with part number, size, shipping weight, list price, and complete specifications. In addition, the catalog includes charts, diagrams, and comprehensive engineering data to save time and trouble on all types of cooling, forced air, and gravity heating installations.

Circle **Item 91** on Inquiry Card

(Continued on page 152)

w-h-e-n

When can a firm manufacturing instruments for temperature, pressure and humidity be the best, if not the biggest in the field?

When is it possible for such an organization to produce the widest and most complete line of indicating and recording instruments available today?

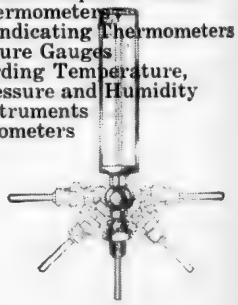
When can you be sure that the instrument you buy, whether a simple thermometer or pressure gauge, or a complex recording unit, is the finest in its price range?

When can you know that promised delivery dates will be kept?

When it's WEKSLER! The reasons are factual and clear: Intensive specialization... modern plant with superior facilities...finest employee relations in the business...a continuing program of research and development... 100% inspection of virtually every item in the line?

Tell us your instrument requirements. We'll send you the information you need.

General Purpose Thermometers
Laboratory Thermometers
Industrial Liquid-in-Glass Thermometers
Dial Indicating Thermometers
Pressure Gauges
Recording Temperature, Pressure and Humidity Instruments
Hydrometers

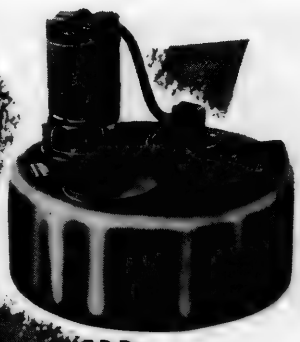


WEKSLER INSTRUMENTS

WEKSLER INSTRUMENTS CORP.
FREEPORT, L. I., NEW YORK

THE **weil** TVC

New *Condensate Pumps*



Features:
Low speed (1750 RPM) TVC pumps are easily installed in areas where space is important. Their compact cast iron receiver and sturdy pumping unit assure a trouble-free installation.

Dimensions:
26 gallon cast iron receiver for single or duplex units: Diameter 25"; height of return above floor 10½"; height of unit 36" max.

Installation:
Simple installation: one return connection, one discharge connection. Unit is completely assembled at the factory. Send for Bulletin TVC-300.

Send for Bulletin TVC-300

See Catalog in 1958 Sweet's and 1958 Domestic Eng. Cat. Dir.

Available from Jobbers Stocks!

TVC PUMPS now available in capacities from 750 to 15,000 sq. ft. E.D.R.

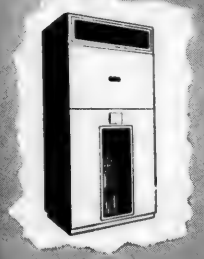
The three sizes of TVC receivers now offer a complete line of low pressure system condensate pumps to fit all requirements. The LOW RETURN CONNECTION and LOW SPEED — 1750 R.P.M., coupled with the built-in durability, operating efficiency and low cost of these pumps guarantee a satisfactory and trouble free installation. This pump provides gravity drainage for low heating units.

Specify and install a **weil** TVC Pump.

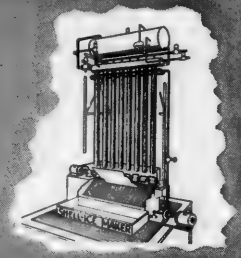
Built for ONE MILLION STARTS . . . without attention

1516 North Fremont Street • Chicago 22, Illinois

THE LEADER IN REFRIGERATION SINCE 1882

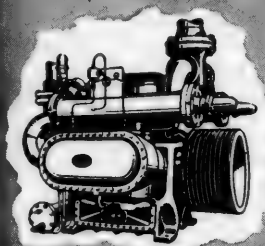


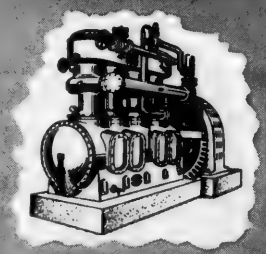
TRADE **FRICK** MARK®



- AIR CONDITIONING SYSTEMS
- CONDENSERS
- AIR COOLING UNITS
- CONTROLS, VALVES & FITTINGS

- ICE-MAKING SYSTEMS
- SHELL-&-TUBE & COIL COOLERS
- QUICK-FREEZING SYSTEMS
- LOW PRESSURE REFRIGERATION UNITS





FRICK COMPANY designs and manufacturers equipment engineered to your individual requirements.
If you need any type of commercial or industrial cooling . . . call your nearest Frick Branch Office or Distributor for recommendations and estimates.

DEPENDABLE REFRIGERATION SINCE 1882

FRICK CO.

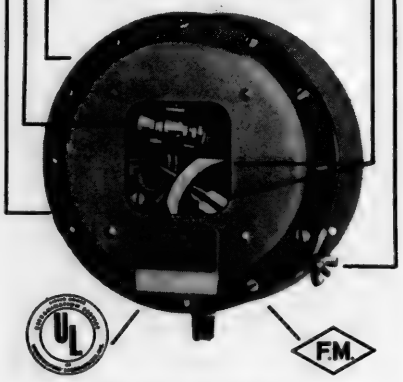
WAYNESBORO, PENNA., U. S. A.

- "ECLIPSE" COMPRESSORS
- HEAVY-DUTY COMPRESSORS

MERCOID®
WEATHER PROOF CONTROLS

For PRESSURE – TEMPERATURE

- *Bourdon tube operated*
- *Hermetically sealed mercury switch*
- *Visible On-Off circuit*
- *Outside adjustments*
- *Visible calibrated dial*
- *Visible operating point indicators*
- ZINC PLATED STEEL CASE



FOR OUTDOOR APPLICATIONS
NEMA 1A, 2, 3, 4

Available in various operating ranges with differentials to meet your requirements.

WRITE FOR BULLETIN 6-18

ALL MERCOID CONTROLS INCORPORATE SEALED MERCURY CONTACTS

THE MERCOID CORPORATION
4201 BELMONT AVE., CHICAGO 41, ILL.

NEW CATALOGS

(Continued from page 150)

Use the prepaid postcard on last page for securing your copies of catalogs described in this department.

HEATING, COOLING CONTROLS — A condensed catalog, No. 1508-AE, of heating and air conditioning controls is available from the manufacturer, Penn Controls, Inc., Goshen, Ind. The catalog contains several new listings, in addition to the controls previously shown. Series 872X line voltage heating and cooling thermostats are cataloged for the first time as well as a new triple-function hot water control. A feature of the catalog is a useful thermostat heater information guide.

Circle **Item 92** on Inquiry Card

WALL-HUNG FIXTURE CARRIERS — Available from Josam Manufacturing Co., Michigan City, Ind., is a booklet combining Price List FC, covering the company's Unitron carriers and closet fittings, and Manual FD, which includes 10 pages of selection charts relating the company's carriers to many makes and types of wall-hung fixtures. Also presented are 4 pages of installation diagrams.

Circle **Item 93** on Inquiry Card

FOOT SQUARING SHEARS—Bulletin 80-FC from Niagara Machine & Tool Works, Buffalo, N. Y., illustrates and describes the design and operating features of the company's Series F and Series G foot squaring shears for light sheet metal-working. Cutting lengths and capacities of all models are given in specifications.

Circle **Item 94** on Inquiry Card

REFRIGERATION EQUIPMENT — J. E. Watkins Co., Maywood, Ill., has published Bulletin CC-1 and Price List PCC-1 on its Cycle Center. This unit combines compressor protection with sub-cooled liquid feed at constant pressure and at constant suction temperature. Specifications are included.

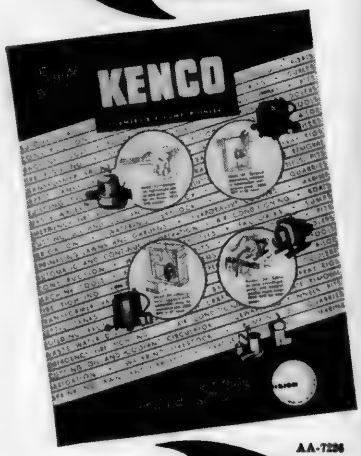
Circle **Item 95** on Inquiry Card

RADIANT-ACOUSTICAL CEILING — A 4-page brochure on aluminum radiant-acoustical ceiling is available from Airtex Corporation, Chicago, Ill. This pamphlet fully describes the aluminum radiant panel that can be used in conjunction with standard acoustical tiles for radiant heating, cooling, and noise reduction. A schematic illustration of the installation of the ceiling is included.

Circle **Item 96** on Inquiry Card

(Concluded on page 154)

KENCO
means
MORE PUMP PROFITS



AA-7226

NEW CATALOG Shows You HOW!

First and still Finest In Submersible Pumps

KENCO

For the Home
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For the Farm
For Emergencies
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Write today for Catalog

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The American Crucible Products Co.
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Airsan Viro Crimp
HIGH VELOCITY AIR FILTERS

VIRO CRIMP MEDIA
has special Hemmed Edges for strength and safe, easy handling. No Cuts! No Scratches! No Filter surface damage.

- MAXIMUM EFFICIENCY (288 — 510 FPM)
- MINIMUM RESISTANCE
- NO DIRECT AIR PASSAGE
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AFI MEMBER AIR FILTER INSTITUTE

Also Available . . .
Low Velocity and Grease Filters.
Write for catalogs and prices.

Air Filter Corporation
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Canadian Representative
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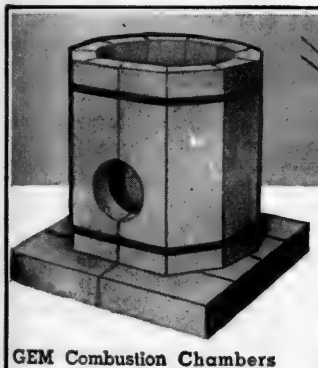
A few distributorships available.
Write for details!

GEM REFRACTORIES



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GEM Combustion Chambers are engineered refractories built for performance and designed for easy, fast installation . . . highest combustion efficiency for high or low-pressure burners.

ENGINEERED TO YOUR REQUIREMENTS

. . . GEM engineers are at your service for special designs . . . developing new units or redesigning to reduce assembly costs. Send us your prints.

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Call on GEM Engineers for your Refractory Shapes.
GEMCO BOND refractory cement insures maximum bonding strength.

GEM CLAY FORMING, INC.
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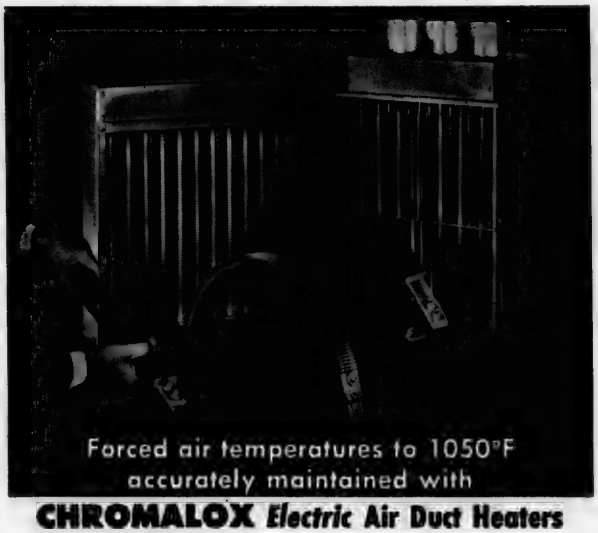

Forced air temperatures to 1050°F accurately maintained with

CHROMALOX *Electric* Air Duct Heaters

For heating air or gases under forced circulation, Chromalox Electric Air Duct Heaters are the efficient, economical answer.

For drying, curing, baking. For heat-treating and annealing ovens. Space heating or adapting air-conditioning systems for central heating.

Heaters can be installed quickly and easily in round or rectangular ducts and accurately controlled either manually or by automatic thermostat.

115, 208, 230 and 460 volts. 91 *standard stock* types, sizes and ratings are ready for immediate delivery.

C-2109

FREE BULLETIN — Call your Chromalox Representative or write for Bulletin F-1559

Edwin L. Wiegand Company
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DRY and CLEAN AIR at the RIGHT TEMPERATURE

- to control your product quality
- to protect a critical operation
- to protect apparatus from moisture damage
- to DRY your material or product
- to control packing or storage conditions
- to assure precision in testing or research
- to increase air conditioning capacity

Air Condition by the NIAGARA Method Using HYGROL Liquid Absorbent

This compact method, giving high capacity in small space, removes moisture from air by contact with a liquid in a small spray chamber. The liquid spray contact temperature and the absorbent concentration, factors that are easily and positively controlled, determine exactly the amount of moisture remaining in the air.

Most effective because... it removes moisture as a separate function from cooling or heating and so gives a precise result, and always. Niagara machines using liquid contact means of drying air have given over 20 years of service. The apparatus is simple, parts are accessible, controls are trustworthy.

Most reliable because...the absorbent is continuously reconcentrated automatically. No moisture-sensitive instruments are required to control your conditions... no solids, salts or solutions of solids are used and there are no corrosive or reactive substances.

Most flexible because...you can obtain any condition at will and hold it as long as you wish in either continuous production, testing or storage.

Write for Bulletins 112 and 131 and complete information on your air conditioning problem.

NIAGARA BLOWER COMPANY

Dept. HV-5, 405 Lexington Ave., New York 17, N.Y.

Niagara District Engineers in Principal Cities of U. S. and Canada

Decrease pipe welding expense with H & M Pipe Cutting and Beveling Machines

PAT. APPLIED FOR

COMPLETE ACCURACY WITH UNSKILLED LABOR

H & M Model "0" in action

Precision cuts and bevels are literally "cranked out" with an H & M machine, even when operated by your most inexperienced workman. The H & M Pipe Cutting and Beveling Machine is completely portable and extremely easy to operate, with a design that stresses speed, accuracy and durability.

H & M equipment will save enough time and labor in the pipe cutting and beveling phase of your welding operation to greatly reduce your overhead and increase your profits. Available in sizes to fit 1½" to 36" pipe.

FULL DETAILS AVAILABLE IMMEDIATELY

H&M **PIPE BEVELING MACHINE COMPANY**
311 E. Third St. Diamond 3-0241
TULSA, OKLAHOMA

NEW CATALOGS

(Concluded from page 152)

Use the prepaid postcard on last page for securing your copies of catalogs described in this department.

SCHOOL HEATING AND VENTILATING Catalog No. DS-327C describing the company's line of Torrivent heating and ventilating units for school applications is announced by The Trane Company, La Crosse, Wis. According to the company, popular demand for the unit in this field is for gymnasium, auditorium, cafeteria and library installations, or wherever quiet-operating, large capacity institutional heating and ventilating equipment is required.

Circle **Item 97** on Inquiry Card

PRESSURE GAGES—Introducing a line of high-reliability gages, Kunkle Valve Co., Fort Wayne, Ind., offers a 48-page catalog illustrating gages with ranges from 15 psi, or 30 inches of vacuum, to 20,000 psi, plus complete engineering data and selection tables for applications in processing plant and power instrumentation.

Circle **Item 98** on Inquiry Card

GARBAGE DISPOSERS—An all-inclusive reference guide to garbage disposers is published by In-Sink-Erator Mfg. Co., Racine, Wis. The 12-page publication fully describes and color-illustrates all units, both domestic and commercial, and includes individual model specifications, charts that guide in the selection of the right model for the right job, and individual unit rough-in dimensions charts.

Circle **Item 99** on Inquiry Card

PACKAGED STEAM GENERATOR — Features of the Keystone steam generator, a completely integrated steam generating plant which requires no field piping, wiring, brickwork or special foundation, are described in a 12-page catalog, SB-59, published by Erie City Iron Works, Erie, Pa. The generator has been designed as a baffleless, pressurized two-drum water tube packaged unit.

Circle **Item 100** on Inquiry Card

BLOWER ASSEMBLIES — A 20-min. sound and color film shows, for the first time, how the many types and sizes of blowers are produced by the Lau Blower Company. Called "The Inside Story," the film shows the step-by-step process of converting raw steel into blower wheels and complete blower assemblies. It is available, without charge, to qualified associations and companies. Inquiries regarding bookings should be addressed to the Advertising Department, Lau Blower Co., 2027 Home Avenue, Dayton 7, Ohio.

an actual unsolicited letter from ALEX LINDHOLM RUTLAND, VERMONT

LINDHOLM B
RUTLAND, VER

Bethlehem Foundry and Machine Co.
Bethlehem, Pa.

Dear Sir:

We are writing you to tell you how pleased we have been for the past several years with Bethlehem heating equipment, engineered, sold and installed by the Maccabee Distributors, Inc.

For your information, at our Diner, which has served as many as eighteen hundred persons a day, our entire water heating is furnished by the instantaneous coil directly attached to our fixtures. The main Diner is also heated by steam from this same Dynatherm, and we find our oil operating expense including a small warm air furnace for our Dining room is one dollar and eight cents per day at the present rate of fourteen and eight tenths cents per gallon. Needless to say we are extremely pleased.

We would further like to add that by using two of your large size forced warm air furnaces your engineer saved nearly one thousand dollars on [illegible] one hundred fifty by fif[illegible]

customers the country over have found the same remarkable performance from . . .

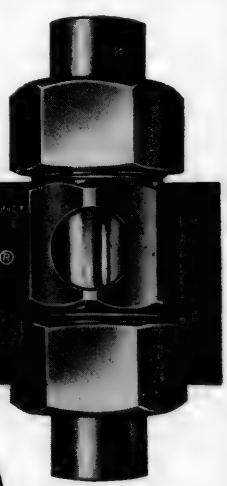
The Bethlehem DYNATHERM

exclusively engineered HEATING UNIT that will PAY FOR ITSELF IN 5 YEARS! Proven fuel savings over 30%

WRITE TODAY FOR EXCLUSIVE DEALERSHIP

BETHLEHEM FOUNDRY & MACHINE COMPANY, BETHLEHEM, PA.

PROVED ON THOUSANDS OF PRODUCTION LINE INSTALLATIONS!



"250" SERIES
LIQUID EYE®
POSITIVE SEALING INDICATORS
designed to save you even more time and money

DESIGN FEATURE

extension-gasket . . . ALL ONE-PIECE!
A built-in gasket that's always in place for positive sealing and foolproof assembly.

6 sizes now available: ⅜", ½", ⅝", ⅞", 1⅛" and 1⅜" O.D.S.

The "250" has all the proved Liquid Eye advantages *plus* these newly engineered features:

- smaller—more compact, simplified design.
- preformed copper extension eliminates need for separate gaskets—*foolproof* installation.
- complete, self-contained, economy unit.

Write today for catalog E-57 covering the complete Allin line.

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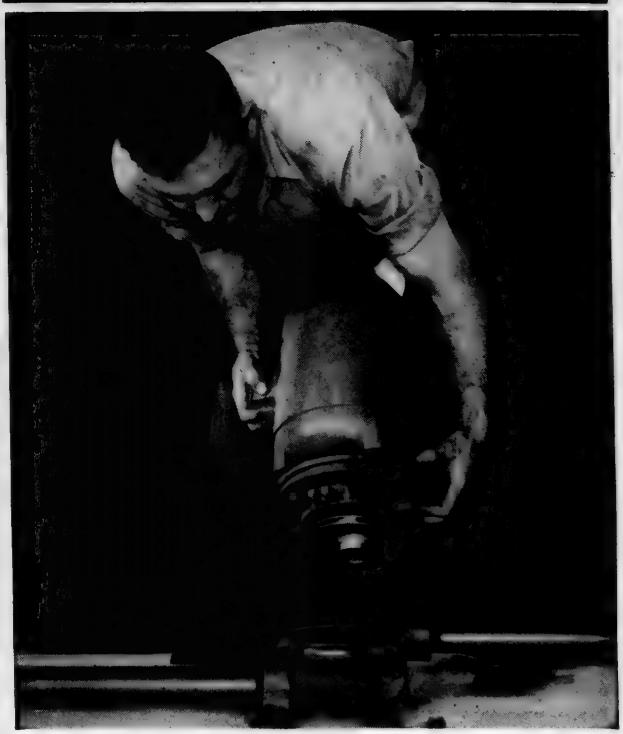
ALLIN MANUFACTURING CO.
410 N. Hermitage Ave. • Chicago 22, Illinois
Over 1,000,000 Liquid Eyes Sold to Date!

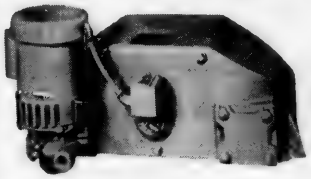
So easy to handle, so compact



Type SCC Hot Water Pump can be completely disassembled by removing only 4 bolts.

. . . you know it's a Wheeler-Economy Pump!

Engineers have chosen Wheeler-Economy Pumps hundreds of thousands of times for heating and air conditioning systems. They're compact, easy to install and maintain, and give many years of dependable service. Operation is smooth and quiet . . . design and construction are top quality.



SCC HOT WATER AND AIR CONDITIONING CIRCULATING PUMPS are space-saving vertical design, yet can be installed horizontally. Ideal for any type package equipment requiring small pumping units. Bronze-fitted with close-grained cast iron casing and motor stand. Bronze impellers dynamically balanced, hand-fitted. Highest quality mechanical seals for leakproof operation.

CONDENSATE RETURN PUMPS have capacities of 2000-8000 sq. ft. EDR, handle condensate to 200°F. Can be operated over wide pressure range without overloading motor. Close-coupled. Easy installation—no sub-base. Disassemble quickly without disconnecting piping. Convert to duplex operation simply by removing blind flange and adding motor and mechanical alternator.

Economy Pump Division
C. H. Wheeler Mfg. Co. 19th and Lehigh Avenue, Philadelphia 32, Pa.

Please send free information on your heating and air-conditioning pumps.

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COMPANY _____

STREET ADDRESS _____

CITY _____ ZONE _____

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Centrifugal, Axial and Mixed Flow Pumps • Steam Condensers • Vacuum Equipment • Marine Auxiliary Machinery • Nuclear Products

ALL STANDARD D-H "PERMA-FAN"

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EVAPORATIVE CONDENSERS

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ARE HOT-DIP GALVANIZED

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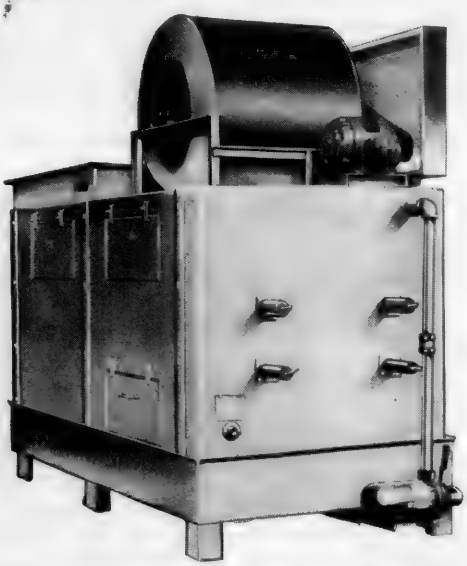

A D-H EXCLUSIVE! FOR FREON 12; FREON 22; AMMONIA. THE D-H PIONEERED BLOW-THRU PRINCIPLE... NOT DRAW-THRU! PRIMARY COIL SURFACE COPPER TUBING. VOLUME DAMPER ADJUSTMENTS. PRICE? WAY DOWN, ON BEDROCK! 12 MORE FEATURES SHOWN IN OUR "PERMA-FAN" BULLETIN. MAY WE SEND YOU A COPY? WRITE:

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DIVISION OF NATIONAL-U.S RADIATOR CORP

3301 MEDFORD STREET
LOS ANGELES 63, CALIFORNIA

CABLE: CLINCONI LOS ANGELES

COMING EVENTS

Where listed, names or titles of individuals are those from whom further information is available

AIR CONDITIONING SHOW AND MEETING—Western Air Conditioning Industries Association, conference and exhibit, Shrine Exposition Hall, Los Angeles, Calif. E. J. Tavery, 3443 S. Hill St., Los Angeles 7, Calif. ..... **MAY 7-11, 1958.**

WORLD TRADE FAIR—1958 United States World Trade Fair to be held at the New York Coliseum, New York, N. Y. D. J. Jacobson, United Public Relations, Inc., 120 E. 56th St., New York 22, N. Y. ..... **MAY 7-17, 1958.**

MECHANICAL CONTRACTORS CONVENTION—69th annual Convention of the Mechanical Contractors Association of America, Inc., at the Ambassador Hotel, Los Angeles, Calif. L. B. Gruman, executive secretary of the Association, Suite 570, 45 Rockefeller Plaza, New York 20, N. Y. ..... **MAY 20-23, 1958.**

INDUSTRIAL RESEARCH CONFERENCE—Ninth annual Industrial Research Conference at Arden House, Columbia University, New York, N. Y. R. T. Livingston, director, Columbia University, 409 Engineering Building, New York 27, N. Y. ..... **JUNE 1-6, 1958.**

NDHA CONVENTION—49th annual meeting of the National District Heating Association, at the French Lick-Sheraton, French Lick, Inc., J. F. Collins, Jr., secretary of the Association, 827 N. Euclid Ave., Pittsburgh 6, Pa. ..... **JUNE 2-6, 1958.**

OIL HEAT EXPOSITION—22nd Oil Heat and Air Conditioning Exposition at the New York Coliseum, New York. C. H. Pesterfield, secretary, Oil Heat Institute of America, Inc., 500 Fifth Ave., New York 36, N. Y. ..... **JUNE 9-12, 1958.**

MATERIALS HANDLING CONFERENCE—Materials Handling Conference, sponsored by the American Society of Mechanical Engineers, at the Public Auditorium, Cleveland, Ohio, to be held concurrently with the National Materials Handling Exposition. Clapp & Poliak, Inc., 341 Madison Ave., New York 17, N. Y. **JUNE 9-12, 1958.**

ASTM MEETING—Annual meeting of the American Society for Testing Materials, at the Hotel Statler, Boston, Mass. Secretary of the Society, 1916 Race St., Philadelphia 3, Pa. . . **JUNE 22-27, 1958.**

JOINT ASHAE-ASRE MEETING—Joint summer meeting, American Society of Heating and Air-Conditioning Engineers, at the Nicollet Hotel, and American Society of Refrigerating Engineers, at the Hotel Leamington, Minneapolis, Minn. A. C. Hutchinson, secretary of the ASHAE, 62 Worth St., New York 13, N. Y., and R. C. Cross, secretary of the ASRE, 234 Fifth Ave., New York 1, N. Y. ..... **JUNE 23-25, 1958.**

AGA CONVENTION—Annual convention, American Gas Association, at Convention Hall Auditorium, Atlantic City, N. J. Secretary of the Association, 420 Lexington Ave., New York 17, N. Y. ..... **OCTOBER 13-15, 1958.**

REFRIGERATION WHOLESALERS MEETING—Annual meeting of the Air-Conditioning and Refrigeration Wholesalers, at the Sheraton-Palace Hotel, San Francisco, Calif. Secretary of the Institute, 2607 N. High St., Columbus, Ohio. ..... **OCTOBER 22-24, 1958.**

PLASTICS INDUSTRY EXPOSITION—Eighth national plastics exposition of the Society of the Plastics Industry, Inc., at International Amphitheatre, Chicago, Ill., to be held concurrently with the SPI annual national conference, Morrison Hotel, Chicago. Secretary of the Society, 250 Park Ave., New York 17, N. Y. ..... **NOVEMBER 17-21, 1958.**

EXPOSITION AND ASHAE CONVENTION—65th annual meeting, American Society of Heating and Air-Conditioning Engineers (Jan. 26-29, 1959) and 14th International Heating and Air Conditioning Exposition, Philadelphia, Pa. A. V. Hutchinson, secretary of the Society, 62 Worth St., New York 13, N. Y. . . **JANUARY 26-30, 1959.**

ARI EXPOSITION—11th Exposition of the Air-Conditioning and Refrigeration Industry at Convention Hall, Atlantic City, N. J. Geo. S. Jones, Jr., managing director of Air-Conditioning and Refrigeration Institute, 1346 Connecticut Ave., N. W., Washington 6, D. C. ..... **NOVEMBER 2-5, 1959.**

WHAT READERS SAY

Electric Heat in Schools

EDITOR, AIR CONDITIONING HEATING AND VENTILATING:

I have read with interest the comments which have appeared in your publication on electric heating of an Indiana schoolhouse. [A Case for Electrically Heated Schools, ACHV, Feb., 1958, page 146].

We have just had an opportunity to bid on a school

heating job in direct competition with electric heating. We find that our direct-fired heating system was 30% less expensive to buy. From our calculations, it would appear that electric heat, at best, would cost about 260% more for operation cost than the oil-fired plant.

The electric utilities maintain that the use of electricity requires one less custodian and that his salary could be credited to the higher electric fuel expense. However, it is not the practice in this state to have a school custodian to watch an oil- or gas-fired heating plant. Gas and oil firing is considered as automatic as electric heating in most Indiana schools. There is no difference in the number of maintenance personnel for any of these three types, and, therefore, no salary saving from using electricity.

Electric utilities have also advanced the idea that if more insulation were used in the buildings, the operating cost of the electric plant would be held down. Wouldn't the fuel cost of an oil- or gas-fired conventional plant also be proportionately lower with extra insulation?

It would appear that the electric utilities had best save their energy for some 30 to 40 years from now, when gas and oil fuels will probably be twice as expensive, and electricity will be perhaps only 75% of today's price.

J. H. ELLIOTT

Elliott-Williams Co.,
Indianapolis, Ind.

BOOK REVIEWS

Publications abstracted in this department should be ordered direct from publisher.

DESIGN OF AIR CONDITIONING SYSTEMS

A new book by F. W. Hutchinson, professor of mechanical engineering, University of California, is always news. This time he has written Design of Air Conditioning Systems, similar to his companion book, Design of Heating and Ventilating Systems, now in its second printing.

He has carefully selected the subject matter and emphasis has been placed on methods of complementing handbook data readily available. Features include:

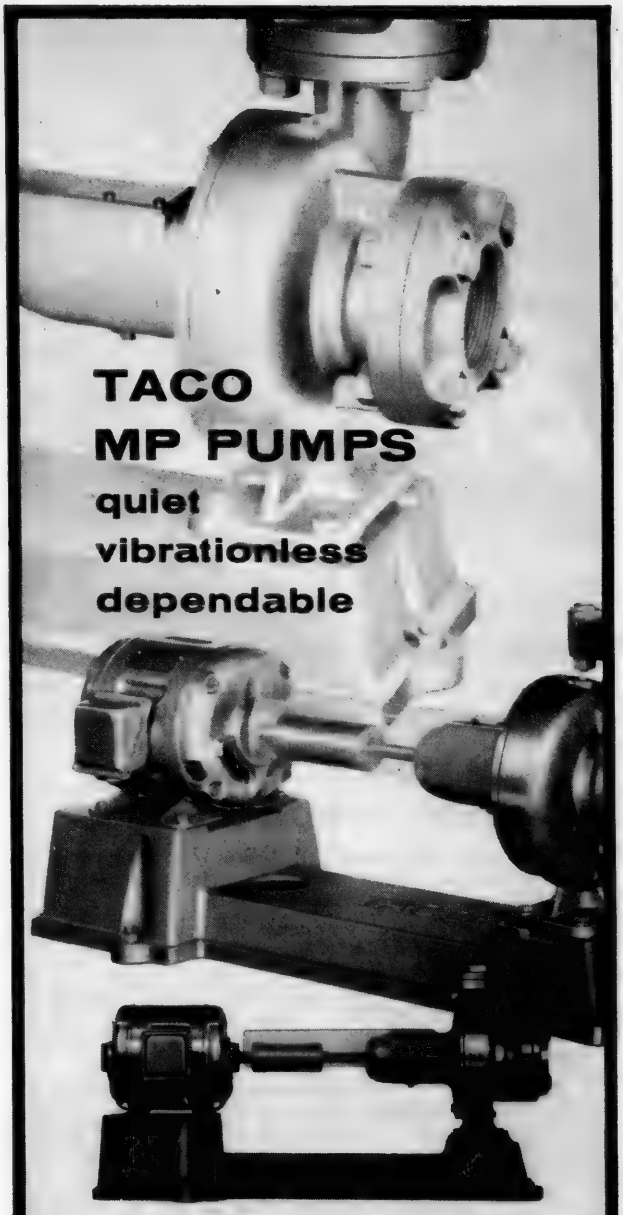
1 Data for determination of inside thermal levels for optimum comfort and means of correcting inside dry bulb temperature for such comfort effects as those due to work rates of occupants, relative humidity, air motion, and radiant transfer.

2 Complete data on solar irradiation rates on walls, roofs, and inclined surfaces, with consideration given to latitude, monthly variation of sun's position, and hourly changes in irradiation rates.

3 A group of 19 full-page, direct reading graphical solutions determining the required dry bulb and wet bulb temperature of conditioned air supply without having to draw on the special background required with most psychrometric charts.

4 A special chapter on the design of panel cooling systems to facilitate precise panel design for selected inside conditions with a minimum of calculation.

An important feature of this book is the provision of full-page graphical solutions of the most important equations in each chapter. In many cases, use of the

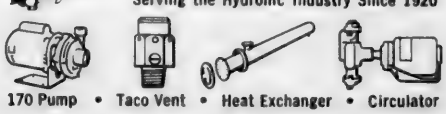


For the big jobs, both heating and cooling, here's the pump that combines rugged quality construction and power with quiet operation and easy installation and service. For complete details — write for Technical Data Sheet TDS7.

Taco

HEATERS INCORPORATED
1160 CRANSTON ST., CRANSTON 9, R.I.
Corporate Office: 342 Madison Avenue, New York 17, New York. In Canada: Taco Heaters of Canada Ltd., 4 Gilead Place, Toronto 2

Serving the Hydronic Industry Since 1920



170 Pump • Taco Vent • Heat Exchanger • Circulator

"WE BUILD THE FANS TO FIT YOUR PLANS!"

Yes . . . in duct fans, as in all types of air-moving equipment, Aerovent offers a size for every standard industrial application (and special sizes to order).

Illustration above shows a huge 84" duct fan . . . one of 24 built by Aerovent for installation in substations of The Consolidated Edison Company in New York City. These mighty fans, with 20 H.P. motors turning 580 RPM, move air against resistance at the rate of 100,000 CFM. Other Aerovent units are available from 12" to 96"; capacities to 145,000 CFM.

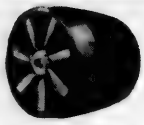
Aerovent Duct Fans . . . direct-driven for standard applications or belt-driven for conditions requiring motor outside airstream . . . may be ordered with special duty motors, alloy propellers and special protective coatings for extreme temperature, moisture or corrosive conditions.

WRITE FOR FREE BULLETIN No. 151

DUCT FANS FOR ALL INDUSTRIAL REQUIREMENTS

Direct-Driven Duct
For installations which permit connection of entire fan assembly in air-stream. For vertical or horizontal use. 12" to 96".

Belt-Driven Duct
Used for corrosive or high-temperature conditions, which require motor to be outside airstream. 2, 4, 6 or 7 blades. 12" to 96".



"Bi-Flo" Duct
For pressures in the 1½" to 4½" range. New 7-blade "Machete" Airfoil Propellers move more air with lower horsepower. 18" to 48".

***"EFFICIENCY-ENGINEERED"* equipment for every air-handling problem!**

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Certified Ratings

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Ash and Brandt Sts. Piqua, Ohio

graphs will entirely eliminate calculation while in others the graphs serve to minimize mathematical work needed in solving design problems. The scales used in constructing the graphs have been so selected that the accuracy to which each graph can be read will equal or exceed the limits of accuracy of the equation from which it was constructed.

Design of Air Conditioning Systems has been written to complement comprehensive textbooks and handbooks on air conditioning, with a selective coverage of the principles and pertinent data of design in a form developed particularly for ease and rapidity of application.

Design of Air Conditioning Systems, by F. W. Hutchinson. Cloth bound, 6 x 9 inches, 336 pages. Published by The Industrial Press, 93 Worth St., New York 13, N. Y. Price, $7.

FUEL OIL MANUAL

Fuel Oil Manual by Paul F. Schmidt, was written for the purchaser, distributor, and user of fuel oil. It presents a practical working knowledge of the composition, properties, methods of storage, treatment, and handling of various grades of oil.

This is the second edition of this book and it has been completely revised. The chapter on fuel oil treatments has been expanded. The author follows a non-technical approach, with terminology simply explained for oil users and handlers rather than chemists and refiners. One aim of Mr. Schmidt, for many years chief chemist of Allied Oil Co., Inc., has been to correct the many mistaken ideas he has encountered in the field; errors arising out of the complex variables introduced by modern methods of refining, blending, and combustion.

Especially useful to engineers and others not intimately or professionally familiar with oil terminology are the clear explanations and supporting data in chapters on what oil specifiers and handlers should know about petroleum chemistry and refining, gravity, combustion, viscosity, stability, treatment, blending, and specifications. Oil users will find a section on troubles and remedies valuable in avoiding costly pitfalls.

Fuel Oil Manual by P. F. Schmidt, 2nd Edition. Cloth bound, 6 x 9 inches, 176 pages. Published by The Industrial Press, 93 Worth St., New York 13, N. Y. Price $4.50

1958 GUIDE

The American Society of Heating and Air-Conditioning Engineers has issued its 1958 Guide.

Revisions and additions were made in the following 14 chapters: Air Contaminants; Cooling Load; Fuels and Combustion; Automatic Fuel Burning Equipment; Heating Boilers, Furnaces, Space Heaters; Radiators, Convectors, Baseboard and Finned-tube Units; Central Systems for Air Conditioning; Air Duct Design; Air Cleaning; Refrigeration; Electric Heating; Industrial Exhaust Systems; Industrial Drying Systems; and Codes and Standards.

As in earlier editions, the material is divided into the following seven sections: Fundamentals, human reactions, heating and cooling loads, combustion and consumption

(Concluded on page 160)

HANDY TO USE... IDEAL FOR SERVICE KITS

Applicator Tip

Won't Crack

Resists Damage

For Service Kits

INDUSTRY'S LEADING PIPE THREAD COMPOUND

Get *Plastic Lead Seal in the handy-to-use 4-oz. plastic applicator tube. It's an ideal size for tool and service kits. Tube won't damage when dropped or hit by blunt tools...never cracks at seams.

Use PLS for water, steam, gas, chemical, refrigerant or petroleum services ...pressures to 6000 psi., temperatures to 500°F. Seals permanently. Never hardens.

Request Sample Tube. *Better yet, send order for special 12-tube package. Act now.*

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HEAT ZONING

with
easy-to-install

ZONVALVE

¾" I.P.S. shown

Now – the comfort of multiple-zone heating at a fraction of the former cost. ZONVALVE, new thermostatically-controlled motorized valve, replaces ordinary radiator valve *without plumbing change.* On new installations, ZONVALVES can be used on radiators or branch lines.

ZONVALVES are made in all standard pipe and tubing sizes. *Low wiring cost* – because motor operator is low voltage. All ZONVALVES equipped with auxiliary switch to start burner or circulator when open.

ZONVALVE is designed for steam and hot water systems. *Unconditionally guaranteed.* Ideal for private homes, factories, office buildings, hotels and motels.

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657 BROADWAY, NEW YORK 12, N. Y.

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ACTUAL AIR DELIVERY

with

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VELOMETER

A simple, direct reading on the Alnor Velometer gives you instant measurement of actual air delivery in any distribution system. This fast, precise method eliminates the time and money wasted in trial-and-error balancing...the profit-eating call-backs so often necessary with other less precise measurements.

The Velometer is the only instantaneous, direct reading air velocity meter—accurate in all ranges, from high to low... compact, portable, easy to understand and use. Wide assortment of jets and fittings makes this precision instrument ideally suited for all air velocity measurement.

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Chicago 10, Ill.

Please send Velometer Bulletin 2448-G.

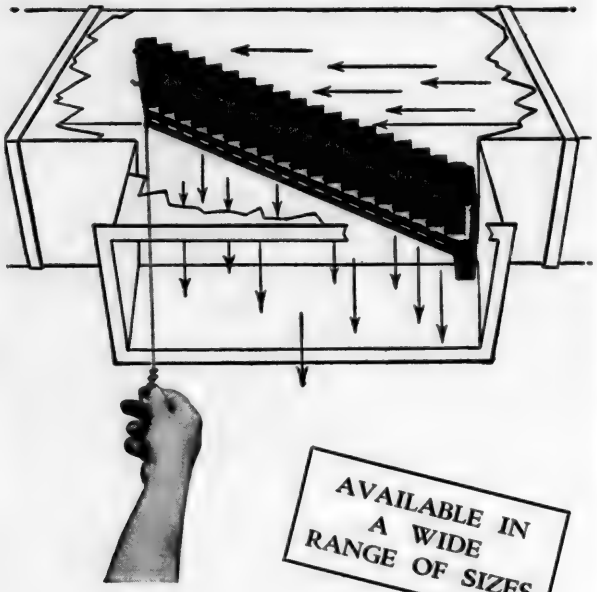
Name.....

Company.....

Address.....

City.....Zone.....State.....

NOW... Divert Air Where You Want It!



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AIR "EXTRACTOR"

This new A-J Air Extractor gives you maximum control of any forced air system. It's not a "damper type" control to meter *available* air flow through a grille, but a "scoop" that diverts air from the main duct to branch ducts or grilles and *increases* output over normal flow where needed.

The curved steel blades of the A-J Extractor are adjustable and act in unison to provide a controlled and uniform flow of air into branch ducts. A single key rod provides fast and easy adjustment through the face of a grille or register, and eliminates need for removal. The extractor is sturdily constructed, and fastened in the duct with two screws. Velocity of the air will not alter setting. Write for full information and prices.

FREE CATALOG
listing, describing and pricing 1,000 types and sizes of grilles, registers, etc.

Select Territories Available

A-J MANUFACTURING CO.

Dept. V-5

3601 E. 16th St. **Kansas City 27, Mo.**

(Concluded from page 158)

of fuels, systems and equipment, special systems, and instruments and codes.

Heating Ventilating Air Conditioning Guide 1958, 36th edition. Cloth bound, 6 x 9 inches, containing a technical section of 1272 pages and a catalog data section. Published by the American Society of Heating and Air-Conditioning Engineers, 62 Worth St., New York 13, N. Y. Price, $12.

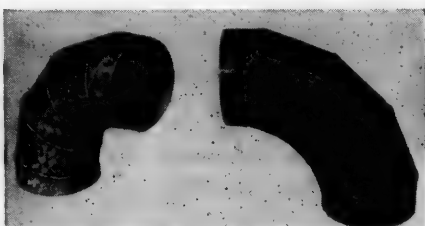
• • •

LETTER SYMBOLS FOR HEAT AND THERMODYNAMICS—Sponsored by ASME, there has been a revision of American Standard ASA Z10, 4-1943. The work of a Sectional Committee on Letter Symbols is contained in a standard listed as ASA Y10, 4-1957. A letter symbol for a physical quantity is a single letter and this report lists the use for such letters. American Society of Mechanical Engineers, 29 W. 39th St., New York 18, N. Y.

Canadian Degree-Days for March, 1958*

City	March		Cumulative	
	1958	Normal	1957-58	Normal
Calgary, Alta	1450	1200	7569	7740
Charlottetown, P. E. I.	1054	1220	5943	6900
Crescent Valley, B. C.	915	940	5970	6600
Edmonton, Alta.	1313	1290	8025	8660
Fort William, Ont.	1141	1380	8114	8750
Grande Prairie, Alta.	1424	1380	8850	9100
Halifax, N. S.	927	1042	5078	5997
London, Ont.	1004	1040	6190	6250
Medicine Hat, Alta.	1336	1130	7128	7510
Moncton, N. B.	1056	1190	6270	7190
Montreal, P. Q.	1180	1180	6686	7240
North Bay, Ont.	1075	1350	7603	8210
Ottawa, Ont.	997	1220	6772	7520
Penticton, B. C.	774	780	4901	5520
Prince George, B. C.	1140	1110	7029	7760
Quebec City, P. Q.	1018	1300	7042	7960
Regina, Sask.	1344	1420	8487	9190
St. John, N. B.	999	1160	6106	7040
Saskatoon, Sask.	1355	1440	8659	9390
Timmins, Ont.	1219	1530	8687	9400
Toronto, Ont.	896	1018	5614	5936
Vancouver, B. C.	642	680	3892	4430
Victoria, B. C.	621	620	3702	4050
Windsor, Ont.	936	950	5609	5710
Winnipeg, Man.	1156	1441	8332	9178

* These data are supplied through the courtesy of the Meteorological Division, Air Service Branch, Department of Transport, Canada.
The Department reports a slight revision in a figure for February as published in last month issue. Corrected figure is: London, Ont., 1305.



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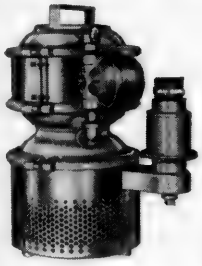
WER-COY FABRICATION CO.
2[illegible] BEAUBIEN DETR[illegible] 6, MICHIGAN

New PUMP is Quiet, Fireproof



LAYTON pneumatic diaphragm pumps have no rotating parts

● The Layton pump needs no priming — responds instantly to give you dependable 3-shift performance. Light yet pumps with higher head. Favorite for water, oil or other fluids in factories, mines, construction—wherever low-cost pumping is needed.

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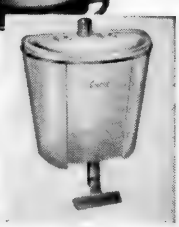
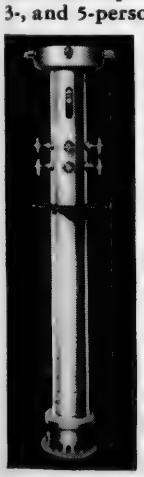
Washfountains—during the past 30 years, have become the standard group type wash fixture throughout the industrial, commercial, public, educational and institutional fields. Made in wide range from the foot-control Duo two-person fixture, to the large circular and semi-circular 54-in. diameter size.



Showers—supplied as Columns only or with stall separations and curtains—in 2-, 3-, and 5-person units are easy to install, and provide more shower facilities at lower cost.



Catalog 5601 gives complete information on all products... Write for your copy today.

BRADLEY WASHFOUNTAIN CO.
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Milwaukee 1, Wisconsin

Write for copy of new Catalog 5601.

BRADLEY washfountains and showers

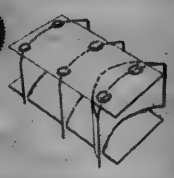
Distributed Through Plumbing Wholesalers

SAVE TIME and MONEY when you form FLEXIBLE CONNECTORS

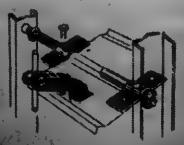
ELGEN SILENT DUCT

Imagine, this one-piece, factory-assembled metal-to-material unit unrolls absolutely *flat!* No more bothering with unwieldy duct material that buckles easily. Elgen Silent Duct makes on-the-spot work a cinch . . . you just measure and cut. You can fabricate *any type* of flexible duct connector in minutes . . . with half the effort! You can save up to 60%! No more worry about an inventory of "made-up" parts, either. Your choice of U.L. approved, (Gov't. Spec. Mil-D-10860) canvas, Johns-Manville asbestos and U. S. Rubber neoprene coated fibre glass, in 3" or 6" widths attached to 24 or 26 gauge galvanized steel or 24 gauge aluminum to fill every job requirement. All available in handy-to-use 25, 50 or 100 foot rolls.

2 More Elgen Products That Put Profits In Your Pocket!



ELGEN ALL-TITE VANE RUNNER
• Quickest and easiest way ever devised for installing turning vanes for square elbows • No special tools required; vanes lock easily with blow of hammer



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For Multi-Blade Dampers — Parallel or Opposed • Most perfect damper hardware developed • Assembles in a jiffy — cuts assembly time in half • Easily adjusted and self-aligning. Licensed by Minneapolis-Honeywell

ELGEN PRODUCTS ARE SOLD THROUGH LEADING JOBBERS EVERYWHERE.

"Put Profits In Your Pocket!"

Write today for free catalog and "spec" sheets!

ELGEN MANUFACTURING CORP. 41-43 39 Street Long Island City, N. Y.

installing SIMPLEX

The only completely integrated radiant-acoustical ceiling for

• economy • comfort • efficiency

The environmental control "package" you have been looking for.
This ceiling does the complete job of heating, cooling and ventilating with one medium—air, while providing acoustical insulation, attractive concealment for overhead services and support for recessed lights.

Economy

– Smaller ducts and fans due to a ⅓ saving in air quantities.
– Permanent aluminum ceiling finishes.
– Air diffusers eliminated.
– Rapid, *one trade* installation.

Comfort

By using only air, SIMPLEX combines:
– the speed of response of forced air systems, with
– the superior comfort of radiant heating and cooling.

Saves Space

– Smaller ducts allow shallower plenum spaces. *Saves on building height.*
– All floor space is free for use by building occupant.

Also—no SIMPLEX radiant-acoustical ceiling has ever caused condensation!

Send today for folder with complete specifications, photographs, and details. Simplex Ceiling Corp., 552 W. 52 St., New York 19, N.Y.

SIMPLEX
Ceiling Corp.
552 West 52 St., New York 19, N. Y.
Please send me folder describing the Simplex all air radiant-acoustical ceiling.

Name.....
Firm.....
Address.....
City.....Zone...State.....

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Territories available in Connecticut, Idaho, Illinois, Kansas, Kentucky, Montana, Nebraska, New Jersey, New York, Ohio, Pennsylvania, Tennessee, Wisconsin, Wyoming, for men experienced in selling central plant conditioners, multizone units, coils, etc., in the mechanical contractor field. Write Thermal Engineering Corp., Manufacturers, P. O. Box 13254, Houston 19, Texas.

see our advertisement this issue on page 58

MANUFACTURERS' AGENTS

An established manufacturer with 25 years experience producing ventilating equipment is looking for manufacturers' agents in many sections of the country to sell their new line of industrial fans. The products include axial flow and tubeaxial fans, both direct and belt driven, and power roof ventilators.

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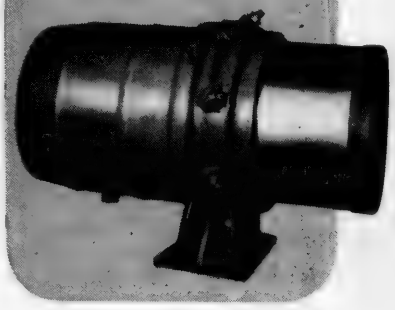
PRINTED FORMS available for immediate shipment. Heating & oil burner materials form, burner service record cards, service order forms, inspection information form, survey sheet and others. Also can supply BURNER SERVICE form in 8 part EZE-SNAP with 2 carbons in each set, 1200 sets IMPRINTED with your name, address and telephone, only $20.40. Send for samples—no obligation. Write Dept. AC, Degree Day Systems, 39-30 58th St., Woodside 77, N. Y.

FOR SALE — Ammonia & Freon Equip.
1—13¼x9 Frick Booster Compressor, Synch. Motor; 3—5¾x4 Frick Booster Compressors, V-belt; 1—5x5 Frick ammonia compressor, V-belt; 1—8x8 Frick ammonia compressor, V-belt; 1—9x9 Frick ammonia compressor, V-belt; 1—30HP Chrysler Freon condensing unit; 2—75-ton S&T Acme Freon Condensers; 1—100-ton S&T Frick Freon condenser; 1—36"x16" Frick ammonia Brine cooler; all in excellent condition.
R. H. Bozman & Brothers
1050 Branby Street, Baltimore 2, Md.

important points about joints

- Yarway Gun-Pakt Joints are serviced *in the line under full steam pressure.*
- Costly shutdowns eliminated.
- Maintenance records show 1 manhour per year per joint.
- Fewer expansion joints needed per length of pipeline with Gun-Pakt.

YARWAY GUN-PAKT EXPANSION JOINTS



For new Yarway Expansion Joint Catalog EJ-1916 write YARNALL-WARING CO., 104 Mermaid Avenue, Phila. 18, Pa.

go YARWAY with confidence

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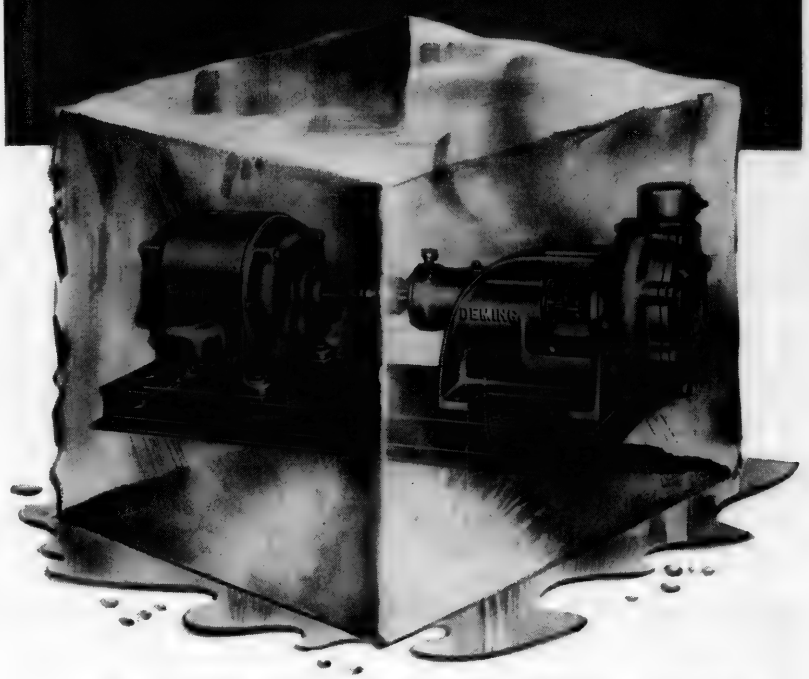
DEMING PUMPS...

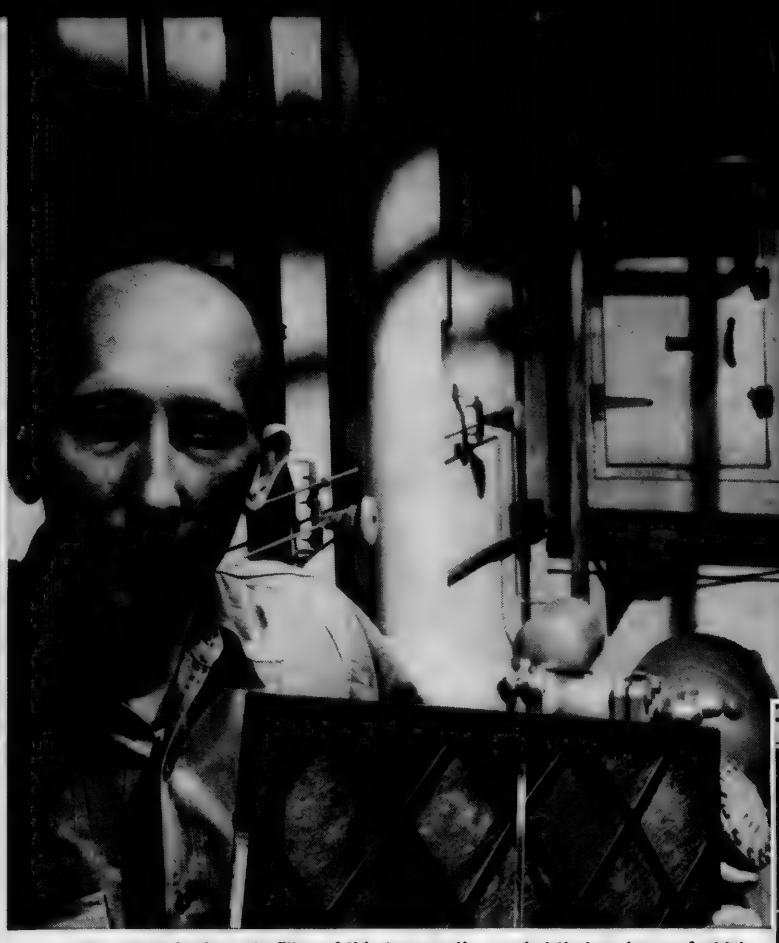


This Deming End-suction centrifugal pump is ideally suited for air-conditioning service. Four-piece liquid end assembly permits easy service and maintenance. Capacities range to 1,000 GPM.

Deming Pumps have proven characteristics that contribute to efficient, economical air-conditioning service, and the big Deming line provides a wide variety of standardized pumps to meet any application.

Bulletins on all Deming Pumps are available. Name your needs and write to:

THE DEMING CO.



"Glasfloss is the only filter of this type on the market that we know of which deals so effectively with the abnormal dust, moisture and velocity conditions under which our air conditioning system operates," says Mr. Harry Havekost of Sixty Wall Tower.

New Glasfloss Safety-Grille Filter has chipboard frame and grille which eliminates danger of cut hands and wrists when changing filters.

New Glasfloss® Fiber Glass Safety-Grille Filters pass critical performance tests at Sixty Wall Tower

"We tested the new Glasfloss Safety-Grille Filters in many critical locations in our building," reports Mr. Harry Havekost, Chief Mechanic in charge of air conditioning, Sixty Wall Tower, New York City. "The results were highly satisfactory."

"Our air conditioning system, operating at 375 to 650 ft/min air velocity, must filter out carbon and paper dust from business machines and dirt from nearby smoke stacks. We also suffer abnormal humidity conditions which cause separation of chipboard frames from metal grilles; this sometimes causes the fiber glass to blow out, impairing filtering efficiency.

"But the new Glasfloss Safety-Grille Filters proved themselves sturdier and more effective than the older-type metal grille filters. The strong, one-piece chipboard frame and grille construction gives a sturdy anchor to the fiber glass and prevents 'blow-outs.' We use two one-inch filters back-to-back in each panel. The grilles line up perfectly; there is no loss of available filtering area.

"Our maintenance men like handling the new chipboard Safety-Grille. Now, there is no danger of annoying cuts which were prevalent when we had to deal with fine-edged metal grilles."

TRY NEW GLASFLOSS SAFETY-GRILLE FILTERS IN YOUR SYSTEM

Get top filtering results—plus safety! Glasfloss Fiber Glass Safety-Grille Filters are available in a complete range of sizes. Call your nearest Glasfloss Distributor or PPG Warehouse for service.

A PRODUCT OF PITTSBURGH PLATE GLASS COMPANY

Sales Offices are located in the following cities: Charlotte, Chicago, Cincinnati, Cleveland, Detroit, Houston, Los Angeles, Minneapolis, New York, Philadelphia, Pittsburgh and St. Louis

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SYMBOL OF SERVICE FOR SEVENTY-FIVE YEARS

PITTSBURGH PLATE GLASS COMPANY

AND PRODUCT INFORMATION SERVICE

Below and on the following pages are given brief digests of the advertisements appearing in this month's issue. Use this Digest to locate and refer to the advertisements in which you are particularly interested, then fill out and mail the prepaid postcard to request further information from manufacturers.

The items appear in the same order as the advertisements to which they refer, to facilitate obtaining further information after reading an advertisement.

NOTE: All advertisements are digested here except those received too late for inclusion. The index of Advertisers lists all the advertisements in this issue.

Use the postcard below for catalogs, new equipment and materials, as well ad Ad-Digest items.

WATER PRESSURE RELIEF VALVES with emergency steam rated pressure safety relief feature are offered by this manufacturer as part of the most complete line of boiler relief valves. Bulletin is available.
Inside Front Cover — Item 200

STEAM TRAPS CUT COSTS..... for contractors who use this company's steam traps because of smaller size, easy installation, and no call-backs. Traps work without attention 3 or 4 years. Steam trap book and unit heater trapping book available.
Page 1 — Item 201

VACUUM PUMPS ..... from this manufacturer give ten important features; other makes give only some of the ten. Bulletin is available.
Page 2 — Item 202

HEAT EXCHANGERS ..... for use below the water line of steam or hot water boilers are described in bulletin available from the manufacturer. Use coupon or circle inquiry number.
Page 5 — Item 203

NEW WROUGHT IRON ..... has been proved more corrosion resistant than various substitutes in extensive testing program which verify convincing case history service records. Information is available.
Page 9 — Item 204

FLUSH VALVES ..... provide a future of faultless service for the five million dollar, 15-story Wachovia Bank and Trust Company building in Charlotte, N. C. Information is available.
Page 11 — Item 205

VENTILATING EQUIPMENT ..... was surveyed by this manufacturer, and consulting engineers rated quiet operation as most important factor. Manufacturer's equipment shows quiet operation, vibration-free performance. Information is available.
Pages 13-15 — Item 206

WELDING FITTINGS ..... available from this manufacturer are detailed in Blue Ribbon catalog. Use coupon in ad or circle inquiry number.
Page 17 — Item 207

IRON BODY WEDGE GATE VALVES.. in outside screw and yoke design are available with screwed or flanged ends, in sizes and types for every purpose. They feature stronger connections, tighter seal and reduced turbulence. Information is available.
Pages 18-19 — Item 208

AIR CONDITIONING UNITS ..... that are factory assembled by this manufacturer prove more economical than field-assembled systems. Florida hotel saved $50,000 annually by using zone-by-zone units instead of field-assembled central station system. Information is available.
Page 20 — Item 209

HEAVY DUTY FANS ..... have high performance characteristics which have resulted in their widespread use in the field of industrial air handling. Minimum maintenance, long life is assured. Two bulletins are available.
Page 21 — Item 210

PNEUMATIC TRANSMISSION ..... simplifies and improves centralized control of air conditioning, and makes control centers easier to understand and operate. Booklet is available.
Pages 22-23 — Item 211

STEEL PIPE ..... was used in the plumbing and fire protection systems of this federal housing project in St. Louis, Mo. Approximately 11,300 ft of pipe, ranging in size from ¾ to 8 inches, comprises the systems in four buildings. Information is available.
Page 24 — Item 212

COMPLETE HEATING PLANT ..... in one package is offered as the smart way to modernize. These famous boiler-burner units are the products of two great specialists, each in its own field. Catalog and specifications are available.
Page 25 — Item 213

ALL-AIR HIGH VELOCITY SYSTEMS.. provide versatile draftless air conditioning for the new office building of the Smith-Douglass Company. Square, round and straight line diffusers used with high velocity units can be adapted to a wide variety of architectural designs. Selection manual is available.
Pages 26-27 — Item 214

PIPE INSULATION ..... made of fiber glass reduces installation time 35% on water, steam, and dual-temperature pipes for parochial school in Baltimore. Information is available.
Page 28 — Item 215

HIGH VELOCITY AIR CONDITIONING requirements are met by this new line of draw-through type units. Also offered is blow-through unit for central station zone control air conditioning which can handle as many as 8 different zones. Bulletins are available.
Page 29 — Item 216

Circle numbers corresponding to the items and advertisements in which you are interested, print your name and address clearly. Information will be sent directly from manufacturers.

INQUIRY CARD

Circle below item numbers on which you wish catalogs or further information

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PLEASE PRINT — May H-58

This service available only to U.S. and Canadian readers.

Name .....

Title or Job Function .....

Firm .....

Nature of Firm's Business .....

Street .....

City .....**Zone** ....**State** .....

This card is void after Aug. 1, 1958

COOLING WITH GAS .....
provides years of trouble-free comfort when the manufacturer's gas absorptive cooler is specified. This cooling can put commercial and industrial heating plants on a year around paying basis. Information is available.
Pages 30-31 Item 217

THERMOSTATIC SHOWER VALVE ...
is industry's first completely recessed thermostatic shower mixing valve. It provides built-in beauty for luxurious showers without dangers of protrusion and with greater showering comfort and safety. Information available.
Page 32 Item 218

FUEL OIL PRE-HEATER .....
uses secondary steam to pre-heat heavy fuel oil in a high temperature hot water system. Additional data are available.
Page 33 Item 219

UNIT AIR CONDITIONERS .....
of the fan-coil type are designed, engineered and manufactured to meet the professional requirements of architect, consulting engineer, mechanical contractor and owner. Universal coil provides summer cooling and dehumidifying and winter heating. Information is available.
Pages 34-35 Item 220

REGISTERS AND GRILLS .....
are tested and approved by Anemostat's laboratories to insure maximum efficiency of equipment; 56-year-old firm offers catalog containing complete data.
Page 36 Item 221

AXIAL FLOW FANS .....
complete with motor and V-belt drive are ready for "in-line" mounting in duct or stack. Information is available.
Page 37 Item 222

RESTRICTOR TUBES .....
in 38 different combinations of length and diameter play a vital role in the packaged air conditioners produced by York Corp., subsidiary of Borg-Warner. This advertiser delivers restrictor tubes that are clean and uniform, batch after batch. An air flow slide rule calculator is available, only by request on your company letterhead, not by item number.
Page 38 Item 223

SOUND LEVEL RATINGS .....
based on octave band analysis have been established by this manufacturer for their air distribution devices, and were prepared as a contribution to the solution of the whole air distribution noise problem. Further information is available.
Pages 39-41 Item 224

LONG LASTING VALVES .....
from this manufacturer were part of the advance planning that went into the new Chicago Sun Times Building. Valves are standard on all plumbing, heating and air conditioning lines in the block-long structure. Information is available.
Page 42 Item 225

HEATING, COOLING COILS .....
from this manufacturer are better because of air activating guides which do away with dead air film. Also featured are permanent mechanical bond of fin and tube. Details are available.
Page 43 Item 226

INDUSTRIAL SPACE HEATERS .....
from this manufacturer are backed by a worldwide organization. Should the need arise, service for both installation and maintenance is as close as your telephone. Bulletin is available.
Pages 44-45 Item 227

DIRECT DRIVE BLOWERS .....
are tested and rated to AMCA specifications. All welded wheels are statically and dynamically balanced. Also available are non-overloading belt drive utility blowers. Two catalogs are available.
Page 46 Item 228

DUCT LINER .....
made exclusively of strong textile-type glass fibers will not pull apart under high vibration and high wind velocity conditions. Information is available.
Page 47 Item 229

AIR FLOW REGULATOR .....
provides permanent automatic balancing and cuts costs in high pressure induction systems for perimeter air conditioning of big buildings. Information is available.
Page 48 Item 230

TEMPERATURE REGULATOR .....
from ths manufacturer gives better control and lasts longer due to more powerful bellows, long life packing, and 60 deg F temperature ranges. Information is available.
Page 51 Item 231

EXTRUDED ALUMINUM LOUVERS ...
are electrically operated for efficient, reliable and economical operation. Information is available.
Page 52 Item 232

POWER FIXED FANS .....
from this manufacturer used from California to Massachusetts were selected for 575 Lexington Ave., N. Y. Seven return fans handling 387,225 cfm were used in addition to 8 general exhaust fans. Information available.
Page 53 Item 233

AIR CONDITIONING PUMPS .....
from this manufacturer are engineered with one idea: To make equipment designers' jobs easier. Choice of pumps, sealless or with mechanical seal, is offered. Information is available.
Page 54 Item 234

BALL BEARING PILLOW BLOCK .....
provides an economical and efficient improvement for air-conditioning equipment. It has been adopted as standard equipment by several manufacturers. Bulletin lists dimensions, load ratings.
Page 55 Item 235

PACKAGED WATER CHILLER .....
series is designed to cut the costs and simplify the process of air conditioning. Eighteen to 246 ton capacity range is produced in the industry. Bulletin is available.
Page 56 Item 236

COMPLETELY PACKAGED BOILER ...
combines reduced overall dimensions with rugged practical boiler construction. Unit is completely packaged and factory fire tested. Bulletin is available.
Page 57 Item 237

HIGH TEMPERATURE, HUMIDITY ....
augmented by excessive heat from electronic equipment and klieg lights are effectively overcome in the new WWL-TV building in New Orleans by the manufacturer's central plant type of multizone air conditioning units. Catalog is available.
Page 58 Item 238

SUPPLY PUMP EQUIPMENT .....
to handle No. 5 and 6 furnace oils is available for commercial and industrial applications. High efficiency and operating performance are characteristic of these supply pumps. Bulletin is available.
Page 59 Item 239

HIGH-PROFIT CONDITIONING LINE ..
features maximum dependability, customer satisfaction, pre-sold prospects (national advertising beamed at virtually every prospect), and priced competitively with generous profit margin. Information available.
Page 60 Item 240

EXTRA-DRY REFRIGERANTS .....
have had their moisture content reduced almost to the vanishing point. Non-corrosive to standard equipment, non-toxic, non-flammable, stable and safe. Information available.
Page 61 Item 241

SLOT-TYPE DIFFUSERS .....
combine the best features of both slots and efficient air diffusers to provide equalized air flow throughout entire length. Diffusers can be located anywhere to suit interior design. Catalog is available.
Page 62 Item 242

TEMPERATURE CONTROL SYSTEM ..
from this manufacturer benefits those concerned with school costs. Economical thermostats stop fuel losses due to wasted heat in unoccupied rooms and overheating in occupied rooms. Information is available.
Page 63 Item 243

FLUSH VALVES .....
are reliable profit builders offering preferred features that cut service costs and win customer confidence. Catalog is available.
Page 64 Item 244

Postage Will be paid by Addressee

No Postage Stamp Necessary If Mailed in the U.S.

BUSINESS REPLY CARD
FIRST CLASS PERMIT NO. 33, SEC. 34.9, P. L. & R., NEW YORK, N. Y.

AIR CONDITIONING, HEATING AND VENTILATING
93 WORTH STREET
NEW YORK 13, N. Y.

AD-DIGEST SERVICE

COOLING TOWER WOOD .....
can very often accumulate fungus growth to the extent that it obstructs air flow through the tower. This manufacturer offers a 20-year guarantee on the wetted deck of cooling tower against failure due to rotting or fungus attack. Information is available.
Page 65 Item 245

AXIAL FLOW FANS .....
save power, labor and space for a large rolling mill. Because of in-line design of the fans no elaborate duct system is required. Bulletin is available.
Page 66 Item 246

BIG REDUCING TEES .....
provide a big help in refrigeration jobs. They save unnecessary bushings, time, and effort. Information is available.
Page 67 Item 247

MOTORS THROUGH 125 HP .....
can be readily connected for part-winding starting, or virtually any other starting method with no sacrifice of operating characteristics. Bulletin is available.
Page 123 Item 248

SQUARE CEILING DIFFUSERS .....
are designed for optimum performance while remaining unobtrusive. Diffusers provide rapid diffusion at low sound level, draft free delivery when used in accordance with published data. Catalog is available.
Page 125 Item 249

ELECTRONIC CLEANER FILTERS ....
reduce size of cooling equipment needed in restaurants, stores, and office buildings, and pay for themselves before installation. Information is available.
Pages 128-129 Item 250

PNEUMATIC ROUND THERMOSTAT ..
is offered in models for every application —summer-winter, day-night, modulating, 2-position, and submaster. Information is available.
Page 130 Item 251

REMOTE TEMPERATURE READINGS..
from any point in an air conditioning system can be read on this new, compact indicator, simply by pressing a button. Information is available.
Page 131 Item 252

HEATING SYSTEM .....
utilizing forced hot water, as shown in ad, employs primary and secondary pumping —a design arrangement developed by this manufacturer for more accurate control of temperatures. Information is available.
Page 133 Item 253

COMFORTABLE STUDENTS .....
are receptive, alert students, eager to learn. Washburn University Building at Topeka, Kansas, uses 113 floor type air conditioning units to provide the finest low cost year-round comfort. Information is available.
Page 135 Item 254

BLOWER DAMPER CONTROL .....
is adaptable to present systems. Two-volume air delivery eliminates two-speed fans, fans in series and fans operating individually. Data are available.
Page 137 Item 255

VACUUM AND BOILER FEED PUMPS..
are designed for each and every heating requirement. Both single and duplex units automatically adjust to varying conditions. Capacities range from 5000 to 100,000 sq ft EDR. Bulletin available.
Page 139 Item 256

Circle numbers corresponding to the items and advertisements in which you are interested, print your name and address clearly. Information will be sent directly from manufacturers.

PACKAGED BOILER .....
is offered for process steam economy. Four pass design with forced draft is the most efficient combination to transmit heat to boiler water. Information is available.
Page 140 Item 257

TURNING VANE FABRICATION .....
is facilitated by these semi-fabricated coils which eliminate layout, tab cutting, hole punching and riveting. Information is available.
Page 141 Item 258

ICE ACCUMULATORS .....
are designed to deliver 32 to 34-deg F water for circulation through air cooling coils in air conditioning systems. The banks may be added to existing systems for increased capacity. Information is available.
Page 141 Item 259

INSULATION ADHESIVES .....
provide excellent coverage, high heat resistance, and easier handling of insulation. A free sample and descriptive catalog are available.
Page 141 Item 260

PIPE UNION .....
features extra wide bronze seats, practically unbreakable nut and body, heavy shoulders and individual vacuum testing. Information is available.
Page 142 Item 261

BOILER-BURNER UNITS .....
offer 12 sizes of one of the best known, best proven boilers for domestic and commercial heating with matched burners for gas or oil. Information is available.
Page 143 Item 262

INDUSTRIAL VENTILATION .....
problems are solved in efficient manner by complete line, certified performance, and competitive pricing of manufacturer's air moving equipment. Catalog is available.
Page 144 Item 263

PACKAGED LIQUID COOLERS .....
are shown by evaluation check charts to offer top value in the field. Charts plus complete data on coolers are available.
Page 145 Item 264

HEAVY DUTY BOILERS .....
for every steam or water heating application up to 1.8 million Btu per hr output are found in this manufacturer's line. Information is available.
Page 146 Item 265

VANEAXIAL BLOWERS .....
power a unique plating tank high temperature exhaust system at Stratford, Conn., plant of Sikorsky Aircraft Division. Manufacturer has equipment that is right for almost any industrial air moving job. Information is available.
Page 147 Item 266

SECTIONAL DUCT FURNACES .....
free the designer from the limitations imposed by packaged heating equipment. A heating or heating-cooling system designed around a duct furnace can be matched to exact job requirements. Information is available.
Page 148 Item 267

BOILER LEVEL CONTROLS .....
are claimed to be the safest because they are simplest in construction. Controls have permanent magnet located outside float chamber eliminating mechanical parts normally subject to wear and fatigue. Catalog available.
Page 149 Item 268

CONDENSATE PUMP .....
is designed specifically for small installations, yet adequate for jobs up to 3000 sq ft EDR. It allows accurate adjustment, is exceptionally quiet and dependable. Information is available.
Page 149 Item 269

FLEXIBLE HOSE .....
is adaptable for all kinds of fume and dust control and ventilation uses. It is durable, lightweight, and easy to install. Information is available.
Page 150 Item 270

INSTRUMENT REQUIREMENTS .....
for measuring temperature, pressure, and humidity are met by this firm in wide, complete lines of indicating and recording instruments. Information is available.
Page 150 Item 271

COMMERCIAL, INDUSTRIAL COOLING
of any type is met by this company, which designs and manufactures equipment engineered to individual requirements. Information is available.
Page 151 Item 272

INQUIRY CARD

Circle below item numbers on which you wish catalogs or further information

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PLEASE PRINT May H-58

This service available only to U.S. and Canadian readers.

Name .....

Title or Job Function .....

Firm .....

Nature of Firm's Business .....

Street .....

City .....**Zone** ....**State** .....

This card is void after Aug. 1, 1958

Ad-Digest

CAST IRON RECEIVERS .....
in three sizes now offer a complete line of low pressure system condensate pumps to fit all requirements. Features include low return connection, low speed and long line. Bulletin is available.
Page 151 Item 273

SUBMERSIBLE PUMPS .....
for home, industry, farm, and emergencies are described in a catalog which is available from this manufacturer. More pump profits promised.
Page 152 Item 274

MERCURY SWITCHES .....
are weather resistant and have calibrated dial, operating point indicators and hermetically sealed contacts for pressure for temperature regulation. Bulletin is available.
Page 152 Item 275

HIGH VELOCITY AIR FILTERS .....
feature high efficiency, minimum resistance, no direct air passage and large dust holding capacity. Catalog is available.
Page 153 Item 276

COMBUSTION CHAMBERS .....
utilizing the manufacturer's engineered refractories are available in special shapes to meet all individual requirements and specifications. Information is available.
Page 153 Item 277

ELECTRIC AIR DUCT HEATERS .....
accurately maintain forced air temperatures to 1050 deg F, and provide an efficient, economical answer to heating air or gases under forced circulation. Bulletin available.
Page 153 Item 278

PIPE CUTTING, BEVELING .....
machines decrease pipe welding expense by literally cranking out precision cuts and bevels even when operated by inexperienced workmen. Details are available.
Page 154 Item 279

DRY AND CLEAN AIR .....
at the right temperature is assured by the manufacturer's method, which removes moisture as a separate function from cooling and heating and so gives a precise result. Bulletins are available.
Page 154 Item 280

POSITIVE SEALING INDICATORS .....
proven on thousands of production line installations have one piece extension gasket for positive sealing and fool-proof assembly. Six sizes. Complete line catalog available.
Page 155 Item 281

HEATING EQUIPMENT .....
from this manufacturer is providing satisfying performance to customers throughout the country. A Vermont diner gets water heating and steam heat from the same unit and oil operating expense is very low. Information is available.
Page 155 Item 282

CIRCULATING PUMPS .....
are chosen for heating and air conditioning because they are compact, easy to install and maintain, and give many years of dependable service. Line includes hot water circulating and condensate return pumps. Information is available.
Page 155 Item 283

EVAPORATIVE CONDENSER .....
bulletin describes units that are hot-dip galvanized after fabrication. Company pioneered blow-through principle. Primary coil surface copper tubing.
Page 156 Item 284

CENTRIFUGAL PUMPS .....
for big heating and cooling jobs combine rugged quality construction and power with quiet operation and easy installation and service. Technical data sheet is available.
Page 157 Item 285

IN DUCT FANS .....
as in all types of air moving equipment the company offers a size for every standard industrial application as well as special sizes to order. Bulletin is available.
Page 158 Item 286

PLASTIC LEAD SEAL SAMPLES .....
are offered to prove that compound gives 100% seal on original connection up to 500 degrees, 6000 psi for water, steam, oil, gas, refrigerants, and chemical and petroleum products.
Page 159 Item 287

LOW-COST HEAT ZONING .....
is available with metering valve which provides the comfort of multiple zone heating at a fraction of the former cost. For steam or hot water, they are unconditionally guaranteed. Details available.
Page 159 Item 288

DIRECT READING VELOMETER .....
measures actual air delivery. Simple, direct reading gives instant measurement in any distribution system. Device is portable, easy to understand and to use. Bulletin is available.
Page 159 Item 289

AIR EXTRACTOR .....
gives maximum control of any forced air system. Not a damper type control, this scoop diverts air from the main duct to branch ducts or grilles. Catalog is available.
Page 160 Item 290

WASHROOM REQUIREMENTS .....
are met by this manufacturer's lines of wash-fountains and showers for industrial, commercial, public, and institutional fields. Catalog is available.
Page 161 Item 291

FLEXIBLE DUCT CONNECTORS .....
of any type are easily fabricated from handy 25, 50, or 100-ft rolls, available from the manufacturer. Catalog is available.
Page 161 Item 292

PNEUMATIC DIAPHRAGM PUMPS ....
have no rotating parts. Quiet and fireproof, the pumps need no priming. Information is available.
Page 161 Item 293

MULTI-PIECE ELBOWS .....
in 5 and 7 sections are of air type arc welded construction. Standard Sizes range from 3 to 40 inches. Information is available.
Page 160 Item 294

RADIANT-ACOUSTICAL CEILINGS ....
provide complete integration for economy, comfort, and efficiency. Never caused condensation! Folder describes them.
Page 162 Item 295

EXPANSION JOINTS .....
from this manufacturer may be serviced in the line under full steam pressure. Costly shutdowns are eliminated. Catalog is available.
Page 162 Item 296

END-SUCTION CENTRIFUGAL PUMP..
is ideally suited for air conditioning service. Four-piece liquid end assembly permits easy service and maintenance. Capacities range to 1000 gpm. Bulletins are available.
Page 163 Item 297

SAFETY-GRILLE FILTERS .....
passed critical performance tests at Sixty Wall Tower, New York City. Besides efficient filtering of carbon and paper dust from business machines, and dirt from smoke stacks, abnormal humidity conditions were overcome. Information is available.
Page 164 Item 298

FILTER-DRIER .....
incorporates an activated ceramic desiccant block for micronic filtration with granular desiccant for high efficiency drying at low pressure drop. Information is available.
Inside Back Cover Item 299

ENGINEERING DATA SHEETS .....
give new and special applications of the manufacturer's controls for use with equipment including expansion and compression tanks, stand-by pumps and pilot temperature hot water heaters. Use coupon in ad, not inquiry number, to get a set of these engineering data sheets.
Back Cover Item 300

Postage Will be paid by Addressee

No Postage Stamp Necessary If Mailed in the U.S.

BUSINESS REPLY CARD
FIRST CLASS PERMIT NO. 33, SEC. 34.9, P. L. & R., NEW YORK, N. Y.

AIR CONDITIONING, HEATING AND VENTILATING
93 WORTH STREET
NEW YORK 13, N. Y.

AD-DIGEST SERVICE

AN ENTIRELY NEW DESIGN
OH BOY! MICRONIC FILTRATION TOO
LOOK AT THAT TRANSVERSE FLOW
ABSO-DRY PRESSURE SEALED "THEY HISS & TELL"
BRASS END CONNECTIONS—EASIER TO SEAL
HIGH WORKING PRESSURE—500 PSI
LOOK! GRANULAR DESICCANT TOO
CERAMIC FIRED DESICCANT BLOCK
NO FOOLING, LESS PRESSURE DROP
ABSO-DRY PRESSURE SEALED DRIER
HENRY VALVE CO.
CONTROLLING FLOW

"DRI-COR"...

a New Name—a Finer Filter-Drier

■ You can expect the best from Henry. Here's the new "Dri-Cor" Filter-Drier. It incorporates an activated ceramic fired desiccant filter core for micronic filtration in combination with granular desiccant for high efficiency drying with low pressure drop. Drying and filtering are properly proportioned.

Like other Henry Driers the "Dri-Cor" is thoroughly reactivated and pressure sealed at the factory, through the exclusive patented Henry Abso-Dry process. This assures maximum drying efficiency at time of installation.

"Dri-Cor" Filter-Drier cartridges with the same design features are also available for Henry Cartridge Type Driers. Definitely a "must" for those who demand the best.

See Your Local Henry Jobber

HENRY VALVE CO.

MELROSE PARK, ILLINOIS (Chicago Suburb)

Cable: Hevalco, Melrose Park, Illinois

VALVES, DRIERS, STRAINERS, AND ACCESSORIES FOR REFRIGERATION, AIR CONDITIONING, AND INDUSTRIAL APPLICATIONS

LISTED BY UNDERWRITERS' LABORATORIES, INC. UNDER RE-EXAMINATION SERVICE FOR MAXIMUM WORKING PRESSURE OF 500 PSI

SPECIAL APPLICATIONS OF McDONNELL PRODUCTS
ENGINEERING REFERENCE SHEET
NO. ERS-5
TO VENT
CITY WATER SUPPLY
OVERFLOW TO DRAIN
MINIMUM WATER LEVEL
McDONNELL HIGH & LOW LEVEL ALARM SWITCHES No. 87, 61, OR 69 SERIES
McDONNELL MAKE-UP WATER FEEDER No. 27T, 247, 51, 51-S, OR 53
CONNECTED TO CONTROL PANEL AT CENTRAL CONTROL STATION
CONNECT TO HIGH POINT OF WATER SYSTEM
McDonnell 69 Series "Built-In" Type Alarm Switches
McDonnell No. 271 Make-up Water Feeder
McDonnell Controls for open expansion tanks
(Mechanical and electrical)
McDonnell & Miller, Inc., 3500 N. Spaulding Ave., Chicago 18, Illinois

NEW DATA SHEETS

. . . for NEW Applications of McDonnell Products

You would probably be surprised at the growing number of McDonnell controls being installed today for use with equipment such as expansion and compression tanks, stand-by pumps, cooling tower and chilled water circulating systems, higher temperature hot water heaters, etc. In most cases these are the standard McDonnell products you know so well.

To bring you up-to-date on such applications, McDonnell has published a series of engineering reference sheets. The simple diagrams and brief explanations will make it easy for you to take a lot of out-of-the-ordinary jobs in stride.

Write for your set of these ERS Sheets. They prove once more: If there's water in it, put McDonnell *on* it!

McDONNELL & MILLER, *Inc.*, 3500 N. Spaulding Avenue, Chicago 18, Illinois

Doing One Thing Well

USE THIS COUPON
to get your set of these Engineering Reference Sheets

Please send me a set of your new Engineering Reference Sheets

COMPANY NAME_____

STREET ADDRESS_____

CITY, ZONE & STATE_____

BY_____